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(71)Applicant : TOYOTA MOTOR CORP
(72)Inventor : TABATA ATSUSHI
NAGANO SHUJI

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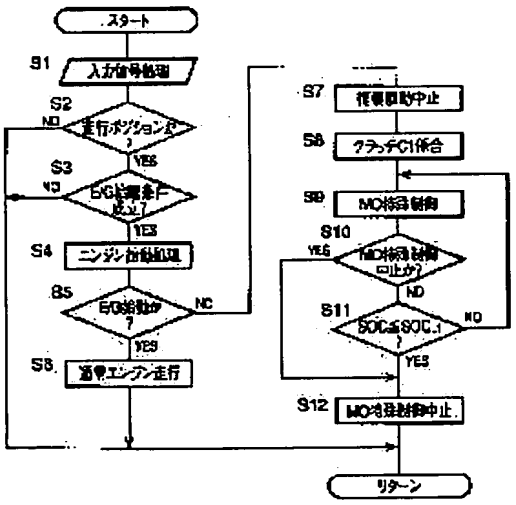
(54) DRIVING SYSTEM OF MOVING BODY AND VEHICLE DRIVING SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To make it possible to prevent a feeling of tardiness caused by a delay in engine start during a shift from a motor running mode to an engine running mode.
SOLUTION: An engine as a driving source is driven to start in a step S4. In this case, a judgment of a step S5 becomes NO when the starting of the engine is slow, and a step S7 and the following steps are carried out. A clutch C1 is engaged to join the engine with a driving force transmission system. An engine starting electric motor MO is operated with torque larger than a starting case while the engine is operated with revolutions so that given driving force is generated for complementing a lack in driving force related with a delay in engine start.



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CLAIMS

[Claim(s)]
[Claim 1] In the drive system of the mobile which has a source of the 1st driving force, and the source of the 2nd driving force where rated output is smaller than this source of the 1st driving force as a source for migration of driving force for moving a mobile The drive system of the mobile characterized by establishing the auxiliary drive control means which uses said source of the 2nd driving force instead, and is operated exceeding the rated output of this source of the 2nd driving force if needed when [with slow actuation initiation of said source of the 1st driving force] it cannot be made to case or operate.
[Claim 2] In the drive system of the mobile which has two or more sources of driving force where the time amount which starting takes differs as a source for migration of driving force for moving a mobile, by the case where at least one source of the 1st driving force starts among said two or more sources for migration of driving force When the starting time amount of this source of the 1st driving force exceeds predetermined time The drive system of the mobile characterized by establishing the auxiliary drive control means operated exceeding the rated output of this source of the 2nd driving force if needed while starting the source of the 2nd driving force where starting time amount is shorter than this source of the 1st driving force among these two or more sources for migration of driving force.
[Claim 3] Said source of the 1st driving force is the engine which operates by combustion of a fuel, and said source of the 2nd driving force is an electric motor which operates with electrical energy. While having an engine starting means to start in order to use said engine as said source for migration of driving force, said auxiliary drive control means In case said engine is started by said engine starting means, when starting of this engine is slow, or when starting of this engine cannot be performed The drive system of the mobile according to claim 1 or 2 characterized by being what uses said electric motor instead and operated exceeding the rated output of this electric motor if needed.
[Claim 4] It is the drive system of the mobile according to claim 3 which, as for said electric motor, electrical energy is supplied from a fuel cell, and is characterized by said auxiliary drive control means being what operates said electric motor exceeding the rated output by increasing the amount of generations of electrical energy of said fuel cell exceeding the amount of rated generations of electrical energy if needed.

[Claim 5] It is the drive system of the mobile according to claim 3 characterized by being what operates this electric motor exceeding the rated output by, as for said electric motor, usually supplying electrical energy alternatively from either a fuel cell and a rechargeable battery, and said auxiliary drive control means's carrying out series connection of said fuel cell and rechargeable battery if needed, and supplying electrical energy to said electric motor.
[Claim 6] In the drive system of the mobile which has a source of the 1st driving force, and the source of the 2nd driving force where rated output is smaller than this source of the 1st driving force as a source for migration of driving force for moving a mobile When [with slow actuation initiation of said source of the 1st driving force] it cannot be made to case or operate It has the auxiliary drive control means which generates driving force, using said source of the 2nd driving force instead. And said source of the 2nd driving force It is the drive system of the mobile characterized by said auxiliary drive control means being what increases the amount of generations of electrical energy of this fuel cell exceeding the amount of rated generations of electrical energy if needed, and operates this electric motor in the electric motor which operates with the electrical energy supplied from a fuel cell.
[Claim 7] In the drive system of the mobile which has two or more sources of driving force where the time amount which starting takes differs as a source for migration of driving force for moving a mobile, by the case where at least one source of the 1st driving force starts among said two or more sources for migration

of driving force When the starting time amount of this source of the 1st driving force exceeds predetermined time It has the auxiliary drive control means which starts the source of the 2nd driving force where starting time amount is shorter than this source of the 1st driving force among these two or more sources for migration of driving force, and generates driving force. And said source of the 2nd driving force It is the drive system of the mobile characterized by said auxiliary drive control means being what increases the amount of generations of electrical energy of this fuel cell exceeding the amount of rated generations of electrical energy if needed, and operates this electric motor in the electric motor which operates with the electrical energy supplied from a fuel cell.

[Claim 8] In the drive system of the mobile which has a source of the 1st driving force, and the source of the 2nd driving force where rated output is smaller than this source of the 1st driving force as a source for migration of driving force for moving a mobile The drive system of the mobile characterized by establishing the auxiliary drive control means which uses the source of the 3rd driving force which is not usually used as a source for migration of driving force as a source for migration of driving force when [with slow actuation initiation of said source of the 1st driving force] it cannot be made to case or operate.

[Claim 9] In the drive system of the mobile which has two or more sources of driving force where the time amount which starting takes differs as a source for migration of driving force for moving a mobile, by the case where at least one source of the 1st driving force starts among said two or more sources for migration of driving force When the starting time amount of this source of the 1st driving force exceeds predetermined time Usually, the drive system of the mobile characterized by establishing the auxiliary drive control means which is the source of driving force which is not used as a source for migration of driving force, and uses the source of the 3rd driving force where starting time amount is shorter than this source of the 1st driving force as a source for migration of driving force.

[Claim 10] Said auxiliary drive control means is the drive system of the mobile according to claim 8 or 9 characterized by being what operates said source of the 3rd driving force exceeding the rated output if needed.

[Claim 11] While having an engine starting means for said source of the 1st driving force to be an engine which operates by combustion of a fuel, and to start in order to use this engine as said source for migration of driving force In case said engine is started by said engine starting means, when starting of this engine is slow, or when starting of this engine cannot be performed, said auxiliary drive control means Usually, the drive system of a mobile given in any 1 term of claims 8-10 characterized by being what uses the electric motor which is not used as a source for transit of driving force as said source of the 3rd driving force.

[Claim 12] Said source of the 3rd driving force is the drive system of the mobile according to claim 11 characterized by being an electric motor for engine starting.

[Claim 13] Said source of the 3rd driving force is the drive system of the mobile according to claim 11 characterized by being an electric motor for an auxiliary machinery drive.

[Claim 14] In the drive system for cars of the hybrid mold equipped with the engine which operates by combustion of a fuel, and the electric motor which operates with electrical energy as a source for transit of driving force for making it run a car A low-speed motor transit means to be at the predetermined low-speed transit time defined beforehand, and to run only said electric motor as a source of driving force at the time of Brake ON, A low-speed engine transit means to be at said predetermined low-speed transit time, and to run said engine as a source of driving force at the time of Brake OFF, The drive system for cars characterized by having a high-speed engine transit means to run said engine as a source of driving force rather than said predetermined low-speed transit at the time of high-speed transit.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the drive system of mobiles, such as a car, and relates to the drive system by which the smooth start engine performance is obtained especially.
[0002]
[Description of the Prior Art] As a source for migration of driving force for moving a mobile, the drive system of the mobile which has a source of the 1st driving force and the source of the 2nd driving force where rated output is smaller than the source of the 1st driving force is known. The drive system for cars of the hybrid mold equipped with the engine which operates by combustion of a fuel, and the electric motor which operates with electrical energy as a source of driving force for car transit is the example, and, generally engine one of rated output is [a system] larger than an electric motor. To the equipment indicated by JP,10-136508,A, the auxiliary transmission which is the example and consists of the epicyclic gear drive of a simple planetary mold is prepared, and various transit modes, such as motor transit mode which makes only an electric motor the source of driving force according to the engagement condition of two clutches, and engine transit mode which makes only an engine the source of driving force, are formed. And in such a drive system for cars, after an engine is generally also stopped at the time of a car halt and departing in motor transit mode, an engine is put into operation and, usually it switches to engine transit mode.
[0003]
[Problem(s) to be Solved by the Invention] However, if engine starting can be slow or it cannot start when putting an engine into operation and shifting to engine transit mode, after departing in motor transit mode in this way, even if driving force is insufficient, it may leave and come and admiration may be produced. If the mass electric motor with which a big output is obtained is carried as a source for transit of driving force, the lack of driving force can be mitigated or canceled by operating the electric motor to high power rather than usual at the time of engine starting improper etc., but while becoming the superfluous quality which is unnecessary at the time of the usual transit and becoming cost quantity, a large-sized and big installation tooth space is needed.
[0004] The place which succeeded in this invention against the background of the above situation, and is made into the purpose has rated output in improving the lack of driving force by which it is accompanied improper [the actuation initiation delay of sources of the 1st driving force, such as a large engine, or actuation], rated output adopting a small small and cheap thing as sources of the 2nd driving force, such as an electric motor.
[0005]
[Means for Solving the Problem] In the drive system of the mobile which has a source of the 1st driving force, and the source of the 2nd driving force where rated output is smaller than the source of the 1st driving force as a source for migration of driving force for the 1st invention to move a mobile in order to attain this purpose When [with slow actuation initiation of said source of the 1st driving force] it cannot be made to case or operate, said source of the 2nd driving force is used instead, and it is characterized by establishing the auxiliary drive control means operated exceeding the rated output of the source of the 2nd driving force if needed.
[0006] in addition, the rotational speed of the motor which "rated output" is the maximum output which can be used continuously, for example, it is "a motor output when reaching constant value in the range in which a temperature rise does not exceed a limit when continuous running of the motor is carried out with a nominal speed" in the case of an electric motor, and operates a nominal speed by "rated output. Even if it performs acceleration and deceleration by the maximum torque, it is an convenient rotational frequency."

Therefore, it can be made to operate exceeding the rated output, without spoiling the endurance of the source of driving force, if it is a short time.

[0007] Moreover, in the case of the electric motor to which the source of driving force operates with the electrical energy supplied from a fuel cell, the rated output of the source of driving force becomes settled by the lower one among the rated output of the amount of rated generations of electrical energy of a fuel cell, and an electric motor. That is, allowances are in the rated output of an electric motor, even if the amount of generations of electrical energy of a fuel cell reaches the amount of rated generations of electrical energy, when an electric motor does not reach rated output, the rated output of the source of driving force is prescribed by the amount of rated generations of electrical energy of a fuel cell, and the output of the electric motor when being operated in the amount of rated generations of electrical energy turns into rated output of the source of driving force. On the other hand, allowances are in the amount of rated generations of electrical energy of a fuel cell, and even if the output of an electric motor reaches rated output, when a fuel cell does not reach the amount of rated generations of electrical energy, the rated output of an electric motor turns into rated output of the source of driving force as it is.

[0008] In the drive system of the mobile which has two or more sources of driving force where the time amount which starting takes differs as a source for migration of driving force for the 2nd invention to move a mobile By the case where at least one source of the 1st driving force starts among said two or more sources for migration of driving force, when the starting time amount of the source of the 1st driving force exceeds predetermined time While starting the source of the 2nd driving force where starting time amount is shorter than the source of the 1st driving force among two or more of the sources for migration of driving force, it is characterized by establishing the auxiliary drive control means operated exceeding the rated output of the source of the 2nd driving force if needed.

[0009] The 3rd invention is the engine with which the source of the 1st driving force of (a) above operates by combustion of a fuel in the drive system of the mobile of the 1st invention or the 2nd invention. Said source of the 2nd driving force is an electric motor which operates with electrical energy, and is (b). While having an engine starting means to start in order to use said engine as said source for migration of driving force (c) in case said engine is started by said engine starting means, said auxiliary drive control means When starting of the engine is slow, or when starting of the engine cannot be performed, said electric motor is used instead and it is characterized by being what is operated exceeding the rated output of the electric motor if needed.

[0010] It sets to the drive system of the mobile of the 3rd invention, and the 4th invention is (a). Electrical energy is supplied from a fuel cell and said electric motor is (b). Said auxiliary drive control means is characterized by being what operates said electric motor exceeding the rated output by increasing the amount of generations of electrical energy of said fuel cell exceeding the amount of rated generations of electrical energy if needed.

[0011] In addition, it can be made to generate electricity exceeding the amount of rated generations of electrical energy, without spoiling the endurance of a fuel cell, if "the amount of rated generations of electrical energy" is the amount of the maximum generations of electrical energy which can be used continuously and it is a short time.

[0012] It sets to the drive system of the mobile of the 3rd invention, and the 5th invention is (a). Electrical energy is usually alternatively supplied from either a fuel cell and a rechargeable battery, and said electric motor is (b). Said auxiliary drive control means is characterized by being what operates the electric motor exceeding the rated output by carrying out series connection of said fuel cell and rechargeable battery if needed, and supplying electrical energy to said electric motor.

[0013] In the drive system of the mobile which has a source of the 1st driving force, and the source of the 2nd driving force where rated output is smaller than the source of the 1st driving force as a source for migration of driving force for the 6th invention to move a mobile (a) When [with slow actuation initiation of said source of the 1st driving force] it cannot be made to case or operate It has the auxiliary drive control means which generates driving force, using said source of the 2nd driving force instead, and is (b). Said source of the 2nd driving force With the electric motor which operates with the electrical energy supplied from a fuel cell, said auxiliary drive control means is characterized by being what increases the amount of generations of electrical energy of the fuel cell exceeding the amount of rated generations of electrical energy if needed, and operates the electric motor.

[0014] In the drive system of the mobile which has two or more sources of driving force where the time amount which starting takes differs as a source for migration of driving force for the 7th invention to move a mobile (a) By the case where at least one source of the 1st driving force starts among said two or more

sources for migration of driving force, when the starting time amount of the source of the 1st driving force exceeds predetermined time It has the auxiliary drive control means which starts the source of the 2nd driving force where starting time amount is shorter than the source of the 1st driving force among two or more of the sources for migration of driving force, and generates driving force. And (b) Said source of the 2nd driving force is the electric motor which operates with the electrical energy supplied from a fuel cell, and said auxiliary drive control means is characterized by being what increases the amount of generations of electrical energy of the fuel cell exceeding the amount of rated generations of electrical energy if needed, and operates the electric motor.

[0015] In the drive system of the mobile which has a source of the 1st driving force, and the source of the 2nd driving force where rated output is smaller than the source of the 1st driving force as a source for migration of driving force for the 8th invention to move a mobile When [with slow actuation initiation of said source of the 1st driving force] it cannot be made to case or operate, it is characterized by establishing the auxiliary drive control means which uses the source of the 3rd driving force which is not usually used as a source for migration of driving force as a source for migration of driving force.

[0016] In the drive system of the mobile which has two or more sources of driving force where the time amount which starting takes differs as a source for migration of driving force for the 9th invention to move a mobile By the case where at least one source of the 1st driving force starts among said two or more sources for migration of driving force, when the starting time amount of the source of the 1st driving force exceeds predetermined time Usually, it is characterized by establishing the auxiliary drive control means which is the source of driving force which is not used as a source for migration of driving force, and uses the source of the 3rd driving force where starting time amount is shorter than the source of the 1st driving force as a source for migration of driving force.

[0017] The 10th invention is characterized by said auxiliary drive control means being what operates said source of the 3rd driving force exceeding the rated output if needed in the drive system of the mobile of the 8th invention or the 9th invention.

[0018] The 11th invention is set to the drive system of which mobile of the 8th invention - the 10th invention. (a) Said source of the 1st driving force is an engine which operates by combustion of a fuel, and is (b). While having an engine starting means to start in order to use the engine as said source for migration of driving force (c) In case said engine is started by said engine starting means, said auxiliary drive control means When starting of the engine is slow, or when starting of the engine cannot be performed, it is characterized by being what uses the electric motor which is not usually used as a source for transit of driving force as said source of the 3rd driving force.

[0019] The 12th invention is characterized by said source of the 3rd driving force being an electric motor for engine starting in the drive system of the mobile of the 11th invention.

[0020] The 13th invention is characterized by said source of the 3rd driving force being an electric motor for an auxiliary machinery drive in the drive system of the mobile of the 11th invention.

[0021] In the drive system for cars of the hybrid mold equipped with the engine which operates by combustion of a fuel, and the electric motor which operates with electrical energy as a source for transit of driving force for the 14th invention to make it run a car (a) A low-speed motor transit means to be at the predetermined low-speed transit time defined beforehand, and to run only said electric motor as a source of driving force at the time of Brake ON, (b) A low-speed engine transit means to be at said predetermined low-speed transit time, and to run said engine as a source of driving force at the time of Brake OFF, (c) At the time of high-speed transit, it is characterized by having a high-speed engine transit means to run said engine as a source of driving force rather than said predetermined low-speed transit.

[0022] In addition, since "Brake ON" generates damping force, the condition that the operator succeeds in brakes operation is meant, and "Brake OFF" means the condition of not succeeding in brakes operation.

[0023]

[Effect of the Invention] In the drive system of the mobile of the 1st invention When [with slow actuation initiation of the source of the 1st driving force where rated output is large] it cannot be made to case or operate, in order to use the source of the 2nd driving force instead and to make it operate exceeding rated output if needed by the auxiliary drive control means, The lack of driving force by which it is accompanied improper [the actuation initiation delay of the source of the 1st driving force or actuation] is improved rated output adopting a small cheap and compact electric motor etc. as the source of the 2nd driving force.

[0024] Moreover, in order to compensate the lack of driving force using the source of the 2nd driving force which is a source for migration of driving force, For example, the move mode using the move mode using the source of the 2nd driving force to the source of the 1st driving force, Or when the actuation initiation

delay of the source of the 1st driving force at the time of shifting to the move mode using both the source of the 1st driving force and the source of the 2nd driving force and actuation are improper, in order to pull to high power, using the source of the 2nd driving force as it is and to make a mobile moved, As compared with the 8th invention and the 9th invention using the source of the 3rd driving force, while being able to increase driving force smoothly, control is easy.

[0025] When the starting time amount of the source of the 1st driving force exceeds predetermined time, the mobile system of the mobile of the 2nd invention While starting the source of the 2nd driving force where starting time amount is shorter than the source of the 1st driving force among two or more sources for migration of driving force by the auxiliary drive control means The lack of driving force by which it is accompanied improper [the actuation initiation delay of the source of the 1st driving force or actuation] is improved rated output adopting a small cheap and compact electric motor etc. as a source of the 2nd driving force like the 1st invention, in order to make it operate exceeding the rated output of the source of the 2nd driving force if needed. Moreover, as compared with the 8th invention and the 9th invention using the source of the 3rd driving force, in order to compensate the lack of driving force using the source of the 2nd driving force which is a source for migration of driving force, while being able to increase driving force smoothly, it is the same as that of the 1st invention for control to be easy.

[0026] It is the case where the 3rd invention - the 5th invention use an engine as a source of the 1st driving force, and an electric motor is used as a source of the 2nd driving force. In case an engine is started by the engine starting means, when starting of the engine is slow, or when engine starting cannot be performed While driving force is generated by the auxiliary drive control means using the electric motor which is a source of the 2nd driving force The lack of driving force by which it is accompanied improper [engine starting delay or starting] is improved rated output adopting a small cheap and compact thing as an electric motor, since the electric motor is operated exceeding rated output if needed.

[0027] Thereby, in the case of the drive system for cars of the hybrid mold with which an engine and an electric motor are used as a source for transit of driving force, the thing which are formed even if it originates in engine starting delay at the time of the shift to engine transit mode (or engine + motor transit mode) from motor transit mode and which it comes, and admiration arises or engine starting therefore becomes improper transit impossible is prevented. Moreover, in order to compensate the lack of driving force using the electric motor which is a source for migration of driving force, In for example, the case of the engine starting delay at the time of the shift to engine transit mode or engine + motor transit mode from motor transit mode In order to pull and run to high power, using the electric motor which was being used in motor transit mode as it is, As compared with the 12th invention and the 13th invention using the electric motor for engine starting, or the electric motor for an auxiliary machinery drive, while being able to increase driving force smoothly, control is easy.

[0028] The amount of rated generations of electrical energy and rated output are able to all adopt a small cheap and compact thing as a fuel cell and an electric motor, and in order to operate an electric motor exceeding rated output by using a fuel cell as an electrical energy source of supply of the above-mentioned electric motor, and increasing the amount of generations of electrical energy of the fuel cell exceeding the amount of rated generations of electrical energy, a drive system is still cheaper and is constituted from the 4th invention by the compact. Moreover, compared with the case where it uses together with a rechargeable battery like the 5th invention, control is easy.

[0029] The 5th invention by the case where a fuel cell and a rechargeable battery are used as an electrical energy source of supply of the above-mentioned electric motor, and electrical energy is usually alternatively supplied from either In order to operate an electric motor exceeding rated output by said auxiliary drive control means's carrying out series connection of a fuel cell and rechargeable batteries, such as it, if needed, and supplying electrical energy to an electric motor, It is possible to adopt the cheap and compact thing which has the amount of rated generations of electrical energy small as a fuel cell like the 4th invention, and a drive system is still cheaper and is constituted by the compact.

[0030] The 6th invention is one embodiment of the 1st invention substantially, and the same operation effectiveness as the 1st invention is acquired. Moreover, the 7th invention is one embodiment of the 2nd invention substantially, and the same operation effectiveness as the 2nd invention is acquired. In addition, it is the electric motor to which the source of the 2nd driving force operates in the 6th invention of this etc., and the 7th invention with the electrical energy supplied from a fuel cell, and since an auxiliary drive control means is what increases the amount of generations of electrical energy of the fuel cell exceeding the amount of rated generations of electrical energy if needed, and operates an electric motor, it can adopt the cheap and compact thing which has the amount of rated generations of electrical energy small as a fuel cell. In

addition, although the source of the 2nd driving force which consists of the fuel cell and electric motor when the amount of generations of electrical energy of a fuel cell exceeds the amount of rated generations of electrical energy is made to operate exceeding the rated output (output specified in the amount of rated generations of electrical energy), the electric motor itself is not necessarily not necessarily operated exceeding the rated output of an electric motor.

[0031] In the drive system of the mobile of the 8th invention When [with slow actuation initiation of the source of the 1st driving force where rated output is large] it cannot be made to case or operate, in order to use the source of the 3rd driving force which is not usually used as a source for migration of driving force by the auxiliary drive control means as a source for migration of driving force, The lack of driving force by which it is accompanied improper [the actuation initiation delay of the source of the 1st driving force or actuation] is improved rated output adopting a small cheap and compact electric motor etc. as a source of the 2nd driving force.

[0032] When the starting time amount of the source of the 1st driving force exceeds predetermined time, the mobile system of the mobile of the 9th invention In order to use the source of the 3rd driving force where are the source of driving force which is not usually used as a source for migration of driving force by the auxiliary drive control means, and starting time amount is shorter than the source of the 1st driving force as a source for migration of driving force, The lack of driving force by which it is accompanied improper [the actuation initiation delay of the source of the 1st driving force or actuation] is improved rated output adopting a small cheap and compact electric motor etc. as sources for migration of driving force other than the source of the 1st driving force.

[0033] In the 10th invention, the lack of driving force by which it is accompanied improper [the actuation initiation delay of the source of the 1st driving force or actuation] can be improved much more effectively, rated output adopting a small cheap and compact electric motor etc. as sources for migration of driving force other than sources of the 1st driving force, such as a source of the 2nd driving force, in order to operate the above-mentioned source of the 3rd driving force exceeding the rated output if needed.

[0034] The 11th invention - the 13th invention are the cases where an engine is used as a source of the 1st driving force. In case an engine is started by the engine starting means, when starting of the engine is slow, or when engine starting cannot be performed Since driving force is generated by the auxiliary drive control means using the electric motor of the source of the 3rd driving force, The lack of driving force by which it is accompanied improper [engine starting delay or starting] is improved supposing that it is sources for migration of driving force other than sources of the 1st driving force, such as a source of the 2nd driving force of the 8th invention, and rated output adopting a small cheap and compact electric motor etc.

[0035] Thereby, in the case of the drive system for cars of the hybrid mold with which an engine and an electric motor are used as a source for transit of driving force, the thing which are formed even if it originates in engine starting delay at the time of the shift to engine transit mode (or engine + motor transit mode) from motor transit mode and which it comes, and admiration arises or engine starting therefore becomes improper transit impossible is prevented.

[0036] Even if it is at the predetermined low-speed transit time, in the 14th invention at the time of Brake OFF While running an engine as a source of driving force with a low-speed engine transit means In order to run an engine as a source of driving force similarly with a high-speed engine transit means rather than the predetermined low-speed transit at the time of high-speed transit, It compares, when running by operating an engine from the time of start at the time of the usual start from which breaks in an accelerator and it departs, putting an engine into operation in the middle of start acceleration and switching to engine transit from motor transit. The feeling of slowness accompanying the change is solved, and the smooth start engine performance is obtained. On the other hand, it is at the predetermined low-speed transit time, and since it runs only an electric motor as a source of driving force with a low-speed motor transit means, the reduction effectiveness of fuel consumption or exhaust gas which is one of the drive system features for cars of the hybrid mold equipped with the engine and the electric motor as a source for transit of driving force is fully enjoyable in the case of Brake ON (at i.e., the time of the creep transit which moves forward only by adjusting a brake force, or goes astern).

[0037]

[Embodiment of the Invention] Here, the 1st invention - the 13th invention are applied suitable for the drive system for cars of the hybrid mold equipped with the engine (source of the 1st driving force) which operates by combustion of a fuel, and the electric motor (source of the 2nd driving force) which operates with electrical energy as a source for transit of driving force for making it run a car (source for migration of driving force).

[0038] After departing as a drive system for cars of the above-mentioned hybrid mold in the motor transit mode it runs only with an electric motor, when putting an engine into operation and switching to engine transit mode or engine + motor transit mode, it is applied suitably, but while departing in engine transit mode, when operating an electric motor if needed and assisting, it may be applied to the various drive systems for cars.
[0039] as the electric motor (the electric motor used as a source for transit of the 14th invention of driving force is included) used as a source of the 2nd driving force -- dozens -- although it is desirable to use what [about V] that operates by the low battery comparatively cheap and compact -- several -- it is also possible to use the electric motor which operates by the high voltage of 100V grade. It not only generates torque as a source of driving force, but as an electric motor, the motor generator which can be generated electricity by carrying out a rotation drive with the kinetic energy of a car is used suitably. As an engine, a gasoline engine, a diesel power plant, etc. are used suitably.
[0040] It is possible to adopt various sources of driving force other than an engine or an electric motor as a source for migration of the 1st invention, the 2nd invention, the 8th invention, and the 9th invention of driving force.
[0041] Although starting of an engine is efficiently slow, and it can also constitute from the 3rd invention - the 5th invention, the 11th invention - the 13th invention at the time of engine starting so that [driving force] it may always be generated by the auxiliary drive control means For example, a starting delay decision means to judge whether engine starting is slower than the predetermined time defined beforehand is established, and only when it succeeds in decision of the purport that starting is slow, with the starting delay decision means, you may make it generate driving force by the auxiliary drive control means.
[0042] Although the engine starting means of the 3rd invention and the 11th invention is equipped with the electric motor for engine starting like the 12th invention and is constituted, using the electric motor which it has as a source for migration of driving force, the electric motor for an auxiliary machinery drive, etc., it may carry out cranking of the engine and may start.
[0043] Although electrical energy is supplied from a fuel cell in the 4th invention - the 7th invention, electrical energy may be supplied to the electric motor as a source of the 2nd driving force only from rechargeable batteries, such as a dc-battery, and the amount of supply of electrical energy can be increased to it, and it can be operated exceeding the rated output of an electric motor.
[0044] Although do not make into heat the chemical energy produced by oxidation of the fuel supplied from the outside, but it is made to change to direct electrical energy and the hydrogen-oxygen fuel cell is known widely, the fuel cell using other fuels, such as natural gas and alcohol, can also be used for a fuel cell.
[0045] Although the 5th invention carries out series connection of a fuel cell and the rechargeable battery and operates an electric motor by high power, it can also make a fuel cell generate in that case exceeding the amount of rated generations of electrical energy like the 4th invention. When making it generate electricity exceeding the amount of rated generations of electrical energy, it can also be regarded as one embodiment of the 4th invention.
[0046] Although driving force is generated using the source of the 3rd driving force in the 8th invention - the 13th invention, it is desirable not to generate driving force in a source of 3rd driving force independent, and to use together with sources for migration of driving force other than sources of the 1st driving force, such as a source of the 2nd driving force of the 8th invention. In that case, although it is not necessary to not necessarily operate sources for migration of driving force, such as a source of the 2nd driving force, exceeding rated output, it is possible to also make it operate exceeding rated output like the 1st invention - the 7th invention. In that case, it can also be regarded as one embodiment of the 1st invention - the 7th invention.
[0047] By the 12th invention, it is (a), for example. Said engine starting means It is constituted so that said engine may carry out cranking of the engine with the electric motor for said engine starting and may start in the condition of having been separated from the driving force transfer system. (b) Operating the electric motor for said engine starting with bigger torque than the time of said cranking, and rotating the engine, while connecting said engine to a driving force transfer system, said auxiliary drive control means is constituted so that driving force may be generated.
[0048] Although the electric motor for engine starting is used as a source of the 3rd driving force and the electric motor for an auxiliary machinery drive is used by the 13th invention in the 12th invention, on the occasion of implementation of other invention, the electric motor for engine starting of that etc. and the electric motor for an auxiliary machinery drive are not necessarily indispensable.
[0049] The low-speed engine transit means of the 14th invention and a high-speed engine transit means can

also use both an engine and an electric motor as a source of driving force if needed that what is necessary is just what uses an engine as a source of driving force at least.
[0050] Hereafter, the example of this invention is explained to a detail, referring to a drawing. Drawing 1 is the main point Fig. of the hybrid driving gear 10 which is the drive system for cars of the hybrid mold with which this invention was applied. This hybrid driving gear 10 is for FF (front engine front drive) cars, it has the gasoline engine 12 which operates by combustion of a fuel, the motor generator 14 which has a function as the electric motor which operates with electrical energy, and a generator, the epicyclic gear-type auxiliary transmission 16, the belt-type nonstep variable speed gear 18, and the differential gear 20, and driving force is transmitted to the front wheel (driving wheel) of the right and left which are not illustrated from output shafts 22R and 22L. The input shaft 38 of an engine 12, a motor generator 14, an auxiliary transmission 16, and a nonstep variable speed gear 18 is arranged in the sequence on the same axis. An engine 12 and a motor generator 14 are equivalent to the source for migration of driving force for moving the car which is a mobile, and the source for transit of driving force, an engine 12 is a source of the 1st driving force, and a motor generator 14 is a source of the 2nd driving force where rated output is smaller than an engine 12 and where starting time amount is short. Moreover, a nonstep variable speed gear 18 is the main change gear, and about three to 11 change gear ratio is obtained in this example before output shafts 22R and 22L.
[0051] An engine 12 is started by carrying out a rotation drive (cranking) by the electric motor 60 for engine starting (MO). This electric motor 60 is a DC motor, it is operated by low batteries, such as about 12V-36V, and electrical energy is supplied from the dc-battery 26 as accumulation-of-electricity equipment. Crankshaft 12s of an engine 12, it connects with the above-mentioned electric motor 60 mechanically through gears, such as a belt. Auxiliary machinery 64 is connected through a gear and electromagnetic clutches 62, such as a belt, again at crankshaft 12s, and the rotation drive of the compressor of the air-conditioner as auxiliary machinery 64 etc. is carried out. The motor generator 24 is further connected through gears, such as a belt, at crankshaft 12s. This motor generator 24 is an electric motor for an auxiliary machinery drive, and electrical energy is supplied from a dc-battery 26.
[0052] what a dc-battery 26 supplies electrical energy also to said motor generator 14, and is operated -- it is -- this example -- about 36V -- the thing of a low battery is used comparatively and it charges serially during car transit by regenerative braking of a motor generator 14. While putting an engine 12 into operation with an electric motor 60 when a motor generator 14 cannot be operated as an electric motor when the amount SOC of accumulation of electricity of a dc-battery 26 falls below to a predetermined value namely, a dc-battery 26 is charged by carrying out a rotation drive and making a motor generator 24 generate with the engine 12. Thereby, always running using a motor generator 14 is possible except the time of failure. The amount SOC of accumulation of electricity of extent which can put an engine 12 into operation with an electric motor 60 is always secured to a dc-battery 26. In addition, in order to supply electrical energy to an electric motor 60, you may make it form the dc-battery of 12V grade independently [a dc-battery 26].
[0053] The auxiliary transmission 16 is equipped with the 1st epicyclic gear drive 30 of the double planetary mold which approached mutually and was arranged in juxtaposition, and the 2nd epicyclic gear drive 32 of a simple planetary mold. These epicyclic gear drives 30 and 32 are RABINIYO molds with which the pinion gear by the side of the ring wheel of the carrier of the 1st epicyclic gear drive 30 and the pinion gear of the carrier of the 2nd epicyclic gear drive 32 are unified while having the common ring wheel R and Carrier C. And said motor generator 14 is connected with the sun gear S1 of the 1st epicyclic gear drive 30, and an engine 12 is connected with the sun gear S2 of the 2nd epicyclic gear drive 32 through the 1st clutch C1 and a damper gear 34. Moreover, while the sun gears S1 and S2, such as it, are connected with the 2nd clutch C2, the reaction force brake B connects with housing 44, as for Carrier C, rotation is prevented, and the ring wheel R is connected with the input shaft 38 of a nonstep variable speed gear 18 through the output member 36. Clutches C1 and C2 and the reaction force brake B are the things of the friction engagement type made to all carry out friction engagement with an actuator.
[0054] The above-mentioned sun gear S1 is connected to the 2nd clutch C2 prepared in the engine 12 side rather than the motor generator 14 through the connection member 40 of the shape of a cylinder arranged by penetrating the core of the motor generator 14 which adjoins the 1st epicyclic gear drive 30 and is arranged, and Rota of a motor generator 14 is being fixed to the mid-position of the connection member 40 by relative rotation impossible. a sun gear S2 -- the above-mentioned connection member 40 -- inserting in -- relativity -- while connecting with the 1st clutch C1 prepared in the engine 12 side rather than the motor generator 14 through the connection member 42 arranged pivotable, it connects with the 2nd clutch C2, without going via the 1st clutch C1. Moreover, said reaction force brake B is arranged so that the carrier C which begins to be prolonged from between an auxiliary transmission 16 and motor generators 14 to a periphery side may be

fixed to housing 44.
[0055] Thus, since both the epicyclic gear drives 30 and 32 consist of sun gears S1 and S2 and a common ring wheel R, and a total of four rotation elements of Carrier C, there being little engagement equipment of a clutch or a brake and ending etc. is constituted by that equipment is easy as a whole and the compact. Since it is the RABINIYO mold with which the pinion gear by the side of the ring wheel of the carrier of the 1st epicyclic gear drive 30 and the pinion gear of the carrier of the 2nd epicyclic gear drive 32 are unified especially, components mark decrease and it is constituted by still easier and the compact.
[0056] Moreover, while the sun gear S1 is connected to the 2nd clutch C2 through the connection member 40 of the shape of a cylinder arranged by penetrating the core of a motor generator 14 While it is being fixed to the mid-position of the connection member 40 by relative rotation impossible, Rota of a motor generator 14 a sun gear S2 the connection member 40 -- inserting in -- relativity, while connecting with the 1st clutch C1 through the connection member 42 arranged pivotable The connection member 42 is connected to the 2nd clutch C2, without going via the 1st clutch C1. The reaction force brake B Since the carrier C which begins to be prolonged from between an auxiliary transmission 16 and motor generators 14 to a periphery side is fixed to housing 44 and a ring wheel R is connected to the input shaft 38 of a nonstep variable speed gear 18 through the output member 36 as it is, The management (connection structure etc.) for connecting an engine 12, a motor generator 14, the reaction force brake B, and the output member 36 is easy.
[0057] Drawing 2 is the collinear Fig. which expresses the interrelation of the rotational frequency of each rotation elements S1, S2, R, and C of the above-mentioned auxiliary transmission 16 in a straight line, an axis of ordinate is a rotational frequency and the location and spacing of each rotation elements S1, S2, R, and C become settled uniquely by the gear ratio rho1 and rho2 of a connection condition or epicyclic gear drives 30 and 32. While the sun gears S1 and S2 which are input rotation elements are mutually located to the both ends of the opposite side on this collinear Fig., the ring wheel R which is a rotation element for an output is located between Carriers C and the sun gears S1 which are a rotation element for reaction force. In addition, spacing of each rotation elements S1, S2, R, and C in drawing 2 is not what was not necessarily correctly expressed based on gear ratio rho1 and rho2.
[0058] the actuation position (refer to drawing 6) of a shift lever when drawing 3 is drawing showing the relation between the engagement condition of clutches C1 and C2 and the reaction force brake B, and the gear change mode (an example) of an auxiliary transmission 16, it uses an engine 12 as a source of driving force and it uses a motor generator 14 as a source of driving force etc. -- a case -- dividing -- carrying out -- being shown . The "D" position of drawing 6 is the automatic gear change location which carries out advance transit while changing continuously the change gear ratio of a nonstep variable speed gear 18 according to operational status, such as an accelerator control input and the vehicle speed, according to the gear change conditions defined beforehand. The "M" position is the owner stage manual gear change location to which the change gear ratio of a nonstep variable speed gear 18 is gradually changed like an owner stage change gear by operating a shift lever in the "+" location or the "-" location. The "B" position is a stepless manual gear change location to which the change gear ratio of a nonstep variable speed gear 18 is continuously changed according to the cross-direction location of a shift lever. Moreover, "R" is the reverse location which reverses a car, "N" is a neutral location and "P" is a parked position which prevents transit of a car by the Parkin Grock device etc.
[0059] In drawing 3 , by making an engine 12 into the source of driving force, while making clutches C1 and C2 engaged, by both the "D", "M", and "B" positions that carry out advance transit, a change gear ratio is formed in the high-speed advance mode "2nd" of 1 by releasing the reaction force brake B. This high-speed advance mode "2nd" is equivalent to a high-speed stage. In that case, if slip engagement of the 1st clutch C1 is carried out, even when the engine low-speed advance mode "2nd (low speed)" in which engine start is possible is formed and a motor generator 14 cannot be used by a fall, failure, etc. of a dc-battery 26 of the amount SOC of accumulation of electricity, the creep torque of the advance direction can be generated with an engine 12, or a car can be started for the front. By the "R" position, while making the 1st clutch C1 and the reaction force brake B engaged, a change gear ratio is formed by releasing the 2nd clutch C2 in the high-speed go-astern mode "a high speed" of -1/rho 2 (rho 2 is the gear ratio (number of teeth of the number of teeth / ring wheel R of the = sun gear S2) of the 2nd epicyclic gear drive 32). In that case, if slip engagement of the 1st clutch C1 is carried out, even when the engine low-speed go-astern mode "a low speed (engine)" in which engine start is possible is formed like the time of advance and a motor generator 14 cannot be used by a fall, failure, etc. of a dc-battery 26 of the amount SOC of accumulation of electricity, the creep torque of the go-astern direction can be generated with an engine 12, or a car can be started back. Moreover, by both the "N" positions, while releasing clutches C1 and C2, the power transfer from an engine

12 is intercepted by making the reaction force brake B engaged.
[0060] By both the "D", "M", and "B" positions that make a motor generator 14 the source of driving force, while low-speed advance mode "1st" is formed and generating the creep torque of the advance direction at the time of a car halt by making the reaction force brake B engaged while releasing clutches C1 and C2, it departs according to accelerator actuation. The change gear ratio at this time is comparatively large at 1/rho 1 (rho 1 is the gear ratio (number of teeth of the number of teeth / ring wheel R of the = sun gear S1) of the 1st epicyclic gear drive 30), and since big torque amplification is acquired, also in the big change gear ratio of a nonstep variable speed gear 18, and the motor generator 14 conjointly operated by the about [36V] electrical potential difference, practically satisfying creep torque and the practically satisfying start engine performance are obtained. This low-speed advance mode "1st" is a low-speed stage.
[0061] And after the number of rotations of an engine 12 synchronizes with a sun gear S2, it makes the 1st clutch C1 engaged, and the shift to high-speed advance mode "2nd" with an engine 12 from the above-mentioned low-speed advance mode "1st" stops the electric power supply to a motor generator 14 after that, and is made into unloaded condition while it releases the reaction force brake B and really rotates an auxiliary transmission 16, making the 2nd clutch C2 engaged.
[0062] Moreover, by releasing the reaction force brake B, while making both the clutches C1 and C2 engaged The change gear ratio which runs as a source of driving force both an engine 12 and the motor generator 14 is formed in the assistant mode "2nd (assistance)" of 1. If the 2nd clutch C2 is made engaged while releasing the 1st clutch C1 and the reaction force brake B, the change gear ratio which generates damping force will be formed in the regenerative-braking mode "2nd (regeneration)" of 1, carrying out regenerative control of the motor generator 14, and charging efficiently. In addition, assistant mode "2nd (assistance)" should just operate a motor generator 14 at the time of activation in high-speed advance mode "2nd" with an engine 12, and regenerative-braking mode "2nd (regeneration)" should just carry out regenerative control of the motor generator 14 while it releases the 1st clutch C1 and separates an engine 12 at the time of activation in high-speed advance mode "2nd" with an engine 12. Moreover, in the engine low-speed advance mode "2nd (low speed)" in which slip engagement of the 1st clutch C1 is carried out, assistant mode "2nd (assistance)" can operate a motor generator 14, and can also be performed.
[0063] Moreover, by both the "R" positions that make a motor generator 14 the source of driving force, while generating [by making the reaction force brake B engaged, while releasing clutches C1 and C2] the creep torque of the go-astern direction at the time of a car halt by forming low-speed go-astern mode "a low speed (motor)", and making a motor generator 14 generate the torque of inverse rotation, according to accelerator actuation, it departs back. The change gear ratio at this time is comparatively large at -1/rho 1, and since big torque amplification is acquired, also in the big change gear ratio of a nonstep variable speed gear 18, and the motor generator 14 conjointly operated by the about [36V] electrical potential difference, practically satisfying creep torque and the practically satisfying start engine performance are obtained. This low-speed go-astern mode "a low speed (motor)" is a low-speed stage. And what is necessary is to stop the electric power supply to a motor generator 14, and just to make it into unloaded condition, after the shift to high-speed go-astern mode "a high speed" with an engine 12 from this low-speed go-astern mode "a low speed (motor)" operates an engine 12 and makes the 1st clutch C1 engaged.
[0064] Proper use of the above-mentioned engine 12 and a motor generator 14 makes a parameter the vehicle speed and output torque (accelerator control input), and is (a) of drawing 4 . A map M1 or (b) It is set as shown in a map M2. Here, it is (a). On the map M1, although an engine 12 is used in the field of the high vehicle speed and high torque (accelerator control input size) and a motor generator 14 is used in the field of the low vehicle speed and low torque (accelerator control input smallness), in this example which uses the motor generator 14 of a low battery, the use range of a motor generator 14 is comparatively narrow, and is limited to the creep torque and few travel corridors at the time of a car halt. When maps M1 and M2 are chosen according to the transit conditions of cars, such as the amount SOC of accumulation of electricity of a dc-battery 26, etc., for example, the amounts SOC of accumulation of electricity of a dc-battery 26 are insufficient, a map M2 is chosen. Although drawing 4 is for advance transit, it is similarly defined about go-astern transit. In addition, it is also possible to use a motor generator 14 in assistance in the field of the above "2nd" which makes an engine 12 the source of driving force, and "2nd (low speed)." Moreover, the boundary line of each field changes according to the change gear ratio of a nonstep variable speed gear 18 etc.
[0065] Drawing 5 is drawing showing the control network which controls actuation of the hybrid driving gear 10 of this example. While various kinds of signals are inputted into ECU (Electronic Control Unit)50 from a switch, a sensor, etc. which are shown in the left-hand side of drawing 5 By outputting a control

signal etc. to various kinds of equipments which perform signal processing according to the program beforehand memorized by ROM etc., and are shown in right-hand side For example, the vehicle speed V, the accelerator opening (control input of an accelerator pedal) theta, a shift position (actuated valve position of a shift lever), According to operational status, such as the amount SOC of dc-battery accumulation of electricity, and a control input of a foot brake, the gear change mode of an auxiliary transmission 16 is switched, or actuation of an engine 12 and a motor generator 14 is controlled.

[0066] The deceleration / torque configuration switch 52 of drawing 5 are constituted by the slide switch as shown in drawing 7 , and is arranged near the shift lever etc. This adjusts the regenerative-braking torque of the motor generator 14 in case an auxiliary transmission 16 is in regenerative-braking mode "2nd (regeneration)" manually, and damping torque increases, so that it lengthens to the front. That is, according to the actuated valve position of this deceleration / torque configuration switch 52, Rhine in the regenerative-braking mode "2nd (regeneration)" of drawing 4 is moved up and down. Moreover, according to the actuated valve position of deceleration / torque configuration switch 52, an established state is expressed to the setting decelerating indicator 54 of drawing 8 as the backward arrow head by which die length becomes long, so that regenerative-braking torque becomes large. This setting decelerating indicator 54 is formed in an instrument panel.

[0067] Moreover, the controller (MO) 66 of drawing 5 performs output (torque) control of the electric motor 60 for engine starting, it is the inverter with which a controller (MG14) 68 and a controller (MG24) 70 perform output (torque) control, regenerative control, etc. of motor generators 14 and 24, and the electric oil pump 72 is for supplying oil pressure to said clutches C1 and C2 and Brake B, or ABS actuator 74 grade. The system indicator 76 becomes active when a shift lever is operated to the aforementioned "M" position or the "B" position, and as shown in drawing 9 , it carries out the digital readout of the change gear ratio of the whole nonstep variable speed gear. When a change gear ratio does not light up by the "M" position and the "B" position for a certain reason, it succeeds in a fail judging. You may make it blink a change gear ratio at the time of fail.

[0068] Drawing 10 is the property Fig. of the leech hold oil pressure which maintains a car to a idle state. Leech hold oil pressure is the oil pressure of the wheel cylinder prepared in the wheel, is controlled by the ABS actuator 74 of drawing 5 , and is controlled according to the pedal travel of a foot brake. At this example, the foot-brake upper switch 78 and foot-brake ROASUITCHI 80 of drawing 5 detect a pedal travel in two steps, in the field of BS1-BS2 where the amount of treading in of OFF of foot-brake ROASUITCHI 80 by ON (pedal travel) is small, a leech hold is carried out with 50% of oil pressure, and the foot-brake upper switch 78 carries out a leech hold with 100% of oil pressure in a two or more BS [with the large amount of treading in from which foot-brake ROASUITCHI 80 is turned on] field. In addition, the pedal travel of a foot brake is detected continuously, and as an alternate long and short dash line shows, you may make it change leech hold oil pressure continuously.

[0069] On the other hand, in case it starts in order to use an engine 12 as a source of driving force, signal processing is performed by said ECU50 according to the flow chart of drawing 11 . At step S1, input signal processing of reading various kinds of signals required for this control is performed, and it judges whether the actuated valve position of a shift lever is a transit position, i.e., "D", "M", "B", or "R" in step S2 based on the signal supplied from a shift position switch 82 (refer to drawing 5). If it is a transit position, it will judge [whether it shifts to engine transit mode or engine + motor transit mode from whether the engine starting conditions for using an engine 12 as a source of driving force for transit in step S3 are satisfied, and motor transit mode, and] whether it puts into operation and runs an engine 12 simply. Specifically, it is (a) of said drawing 4 . In a map M1 [whether the conditions on which the vehicle speed V, the accelerator control input theta, etc. shift to engine low-speed advance mode "2nd (low speed)" or high-speed advance mode "2nd" with an engine 12 from the low-speed advance mode "1st" by the motor generator 14 are fulfilled, and] Or it is (b) of drawing 4 by the lack of the amount of accumulation of electricity of a dc-battery 26 etc. It is whether to fulfill the conditions which are switched to a map M2 and newly perform engine low-speed advance mode "2nd (low speed)" or high-speed advance mode "2nd" with an engine 12.

[0070] And when engine starting conditions are satisfied, while carrying out cranking of the engine 12 with the electric motor 60 for engine starting in step S4, ignition timing control, fuel-injection control, etc. are performed. At the time of activation of this engine starting processing, the 1st clutch C1 is released and the engine 12 is separated from the driving force transfer system. The part which performs step S4 among signal processing by ECU50 is functioning as an engine starting means. Although the usual transit control which makes an engine 12 the source of driving force in step S6 will be performed at the following step S5 if it judges whether the engine 12 actually started and an engine 12 starts in the predetermined time amount

defined beforehand When an engine 12 does not start in time amount predetermined by a certain reason, such as failure, less than [step S7] is performed following step S5, and driving force is generated using the electric motor 60 for engine starting. The part which performs step S5 among signal processing by ECU50 is functioning as a starting delay decision means.

[0071] At step S7, the burden of the electric motor 60 made to generate driving force is mitigated by releasing an electromagnetic clutch 62 and separating auxiliary machinery 64. At step S8, the 1st clutch C1 is made engaged, an engine 12 is connected to an auxiliary transmission 16, and rotation of an engine 12 is made to be transmitted from output shafts 22R and 22L to a driving wheel through the driving force transfer system of an auxiliary transmission 16 and belt type nonstep variable speed gear 18 grade. It is made for the 2nd clutch C2 other than the 1st clutch C1 to be engaged at the time of advance transit, and is made for the reaction force brake B to be engaged at the time of go-astern transit. And in MO special control of step S9, an electric motor 60 is operated with bigger torque than the time of engine starting of step S4, and driving force is generated, rotating an engine 12. The output of an electric motor 60 is pulled up to the maximum exceeding rated output, the lack of driving force accompanying the starting delay of an engine 12 is specifically compensated, transit a car is enabled or predetermined driving force is generated. Since an electric motor 60 is a DC motor, such control is easily possible for it. The part which performs step S8 and S9 among signal processing by ECU50 is functioning as an auxiliary drive control means, and the electric motor 60 for engine starting is equivalent to the source of the 3rd driving force which is not usually used as a source for transit of driving force. Moreover, the starting time amount of an electric motor 60 can fully be shorter than an engine 12, and can generate driving force promptly. That is, this example is equivalent to the example of the 8th invention - the 12th invention.

[0072] In addition, a motor generator 14 is also operated at the time of special control of the above-mentioned electric motor 60, and the driving force which applied both outputs is generated. That is, when shifting to engine + motor transit mode, also when shifting to engine transit mode, of course, a motor generator 14 is operated with a predetermined output, and generates predetermined driving force with an electric motor 60 instead of an engine 12.

[0073] It judges whether MO special control is stopped, and in stopping, step S12 is performed immediately and it stops MO special control by step S10. When OFF actuation of the ignition switch (switch which switches ON of the drive system of a hybrid car and OFF) 84 of drawing 5 is carried out, for example, change actuation of the shift lever is carried out as termination conditions to the "N" position or the "P" position, MO special control passes beyond predetermined time, and engine starting processing of fuel injection etc. is being performed continuously, it is a time of an engine 12 starting etc. Moreover, at step S11, it judges whether the amount SOC of accumulation of electricity of a dc-battery 26 became one or less lower limit SOCL, and also when it becomes SOC<=SOCL1, MO special control is stopped by step S12. A lower limit SOCL1 is defined on the basis of whether it remains, so that the amount SOC of accumulation of electricity of a dc-battery 26 can be equal to MO special control.

[0074] Thus, the hybrid driving gear 10 of this example In order to run an engine 12 as a source of driving force, in case an engine 12 is started by step S4, when starting of the engine 12 is slow Since decision of step S5 is set to NO, less than [step S7] is performed and driving force is generated using the electric motor 60 for engine starting besides a motor generator 14, The lack of driving force by which it is accompanied improper [the starting delay of an engine 12 or starting] is improved rated output adopting a small cheap and compact thing as a motor generator 14 which is a source of the 2nd driving force. Thereby, in case it departs from the time of the shift to engine transit mode from motor transit mode, or an engine 12 as a source of driving force, the thing which are formed even if it originates in the starting delay of an engine 12 and which it comes, and admiration arises or starting of an engine 12 therefore becomes improper transit impossible is prevented.

[0075] In addition, although the lack of driving force is compensated with the above-mentioned example using the electric motor 60 for engine starting as a source of the 3rd driving force, the lack of driving force is also suppliable using the motor generator 24 for an auxiliary machinery drive. That is, predetermined driving force is generated in step S9, carrying out power running control of the motor generator 24, and rotating an engine 12 instead of using an electric motor 60. Although a motor generator 24 is an AC motor and it is controlled by the inverter, if temporary, the big torque exceeding rated output can be generated by designing so that a high current can be passed beforehand. In this case, it is equivalent to the example of the 13th invention.

[0076] It is also possible to start an engine 12 using the above-mentioned motor generator 24, and an electric motor 60 can be omitted in that case.

[0077] By moreover, the case where drawing 12 carries out special control of the motor generator 14 used as a source of the 2nd driving force for car transit, and the lack of driving force accompanying the starting delay of an engine 12 is compensated So that the lack of driving force accompanying [steps SS1-SS6 are substantially / as steps S1-S6 of drawing 11 / the same, and] the starting delay of an engine 12 may be compensated with a step SS 7 It runs by increasing the electrical energy amount of supply from a dc-battery 26, and operating a motor generator 14 with the large torque exceeding the rated output. Although a motor generator 14 is an AC motor and it is controlled by the inverter, if temporary, the big torque exceeding rated output can be generated by designing so that a high current can be passed beforehand.
[0078] It judges whether MG special control of a step SS 7 is stopped, and in stopping, a step SS 11 is performed immediately and it stops MG special control by the step SS 8. When OFF actuation of the ignition switch 84 is carried out, for example, change actuation of the shift lever is carried out as termination conditions to the "N" position or the "P" position, and engine starting processing of a step SS 4 is being performed continuously, it is a time of an engine 12 starting etc. Moreover, while judging whether the amount SOC of accumulation of electricity of a dc-battery 26 became two or less lower limit SOCL at a step SS 9, it judges whether the duration TS of MG special control became more than predetermined time T1 at a step SS 10, and also when it becomes SOC<=SOCL2 or TS>=T1, MG special control is stopped by the step SS 11. It is set on the basis of whether it remains, so that the amount SOC of accumulation of electricity of a dc-battery 26 can be equal to MG special control, and a lower limit SOCL2 is defined on the basis of the thermal limitation of the motor generator 14 according [fixed time amount T1] to continuation high power etc.
[0079] Also in this case, the same effectiveness as said example is acquired. In order to pull and run to high torque especially in the case of the engine starting delay at the time of the shift to engine transit mode or engine + motor transit mode from motor transit mode, using the motor generator 14 which was being used in motor transit mode as it is, while being able to increase driving force smoothly, as compared with the case where driving force is generated using an another electric motor 60 and an another motor generator 24 like said example, control is easy.
[0080] This example is an example of the 1st invention - the 3rd invention, the part which performs a step SS 4 among signal processing by ECU50 is functioning as an engine starting means, the part which performs a step SS 5 is functioning as a starting delay decision means, and the part which performs a step SS 7 is functioning as an auxiliary drive control means.
[0081] Drawing 13 and drawing 14 are one example of the 14th invention, are applied to said hybrid driving gear 10, and are performed by signal processing by ECU50. At step Q1, input signal processing of reading various kinds of signals required for this control is performed, and it judges whether the actuated valve position of a shift lever is a transit position, i.e., "D", "M", "B", or "R" in step Q2 based on the signal supplied from a shift position switch 82. If it is a transit position, in step Q3, the amount SOC of accumulation of electricity of a dc-battery 26 will judge whether it is three or less lower limit SOCL, and in SOC<=SOCL3, it is (b) of said drawing 4 at step Q4. Although it runs only an engine 12 as a source of driving force according to the shown map M2, if it is SOC>SOCL3, less than [step Q5] will be performed. A lower limit SOCL3 is defined on the basis of whether it remains, so that the amount SOC of accumulation of electricity of a dc-battery 26 carries out power running control and can run a motor generator 14.
[0082] At step Q5, foot-brake ROASUITCHI 80 judges whether abbreviation completeness gets into the foot brake by whether it is ON, and, in ON, it judges whether it is the one or less fixed low vehicle speed VL as which the vehicle speed V was beforehand determined at step Q6. Step Q6 will be for judging whether a car is an abbreviation idle state, and the low vehicle speed VL 1 is set as the value of abbreviation 0 in consideration of the detection error of a sensor etc., if it is V<=VL1, it will set both the outputs of an engine 12 and a motor generator 14 to 0 at step Q7, and will save a fuel and power. Moreover, at step Q8, as shown in drawing 10 , leech hold oil pressure is made into 100%, a wheel brake is operated with high oil pressure, and a car is held to a idle state.
[0083] When decision of the above-mentioned step Q5 is NO (i.e., when the BUREKIROA switch 80 is OFF), less than [of drawing 14 / step Q9] is performed, and when decision of step Q6 is NO, the vehicle speed V performs less than [of drawing 14 / step Q11], when larger than the low vehicle speed VL 1. At step Q9, the foot-brake upper switch 78 judges whether it is that a few is broken into the foot brake (BS1-BS2) by whether it is ON, and, in ON, it judges whether it is the two or less fixed low vehicle speed VL as which the vehicle speed V was beforehand determined at step Q14. the low vehicle speed VL 2 -- for example, drawing 4 (a) the maximum vehicle speed in the low-speed advance mode "1st" in a map M1, and abbreviation -- it is the same vehicle speed, and if it is V<=VL2, while carrying out power running control

of the motor generator 14 at step Q15, the leech hold force is reduced to 50% at step Q16. the torque of a motor generator 14 -- irrespective of the leech hold force (50%) and the damping force of a foot brake -- abbreviation -- if it is a level flat way, it is set as the magnitude which generates the creep torque to which a car moves forward little by little. It is similarly set up at the time of go-astern transit. Therefore, the amount of treading in of a foot brake (pedal travel) is comparatively small (within the limits of BS1-BS2), and when the vehicle speed V is the two or less low vehicle speed VL, a car is made to ** by the motor generator 14 also with Accelerator OFF approximately, and creep transit can be carried out only by the strength of brakes operation like a common automatic car equipped with the torque converter.

[0084] On the other hand, also in ON, when decision of step Q9 is NO (i.e., when [the case where treading-in actuation of the foot brake is not carried out, and when decision of step Q14 is NO]), the vehicle speed V performs [a foot brake] less than [step Q10], in being larger than the low vehicle speed VL 2. Drawing 4 which runs only an engine 12 as a source of driving force at step Q10 (b) A map M2 is set up, and it runs at step Q11, putting an engine 12 into operation with an electric motor 60 etc., and switching gear change mode according to a map M2. At step Q12, gear change control of a nonstep variable speed gear 18 is performed according to operational status, such as the vehicle speed V and the accelerator control input theta, or shift-lever actuation, and a leech hold is completely canceled at step Q13.

[0085] In this example, when treading-in actuation of the foot brake is not carried out (step Q9 is NO) In order to run only an engine 12 as a source of driving force according to a map M2, It compares, when running by operating an engine 12 from the time of start at the time of the usual start from which breaks in an accelerator and it departs, putting an engine 12 into operation in the middle of start acceleration and switching to engine transit from motor transit. The feeling of slowness accompanying the change is solved, and the smooth start engine performance is obtained. Since it runs only a motor generator 14 as a source of driving force in carrying out creep transit only by the strength of brakes operation on the other hand, if the amount of treading in of a foot brake (pedal travel) is comparatively small (within the limits of BS1-BS2), and it puts in another way when the vehicle speed V is the two or less low vehicle speed VL (step Q14 is YES), the reduction effectiveness of fuel consumption or exhaust gas which is one of the descriptions of the hybrid driving gear 10 is fully enjoyable.

[0086] In this case, the part which performs step Q15 among signal processing by ECU50 is functioning as a low-speed motor transit means, and the part which performs step Q11 is functioning as a low-speed engine transit means and a high-speed engine transit means.

[0087] Drawing 15 is the outline block diagram of the hybrid driving gear 100 which is the drive system for cars of the hybrid mold with which this invention was applied, and drawing 16 is a main point Fig. This hybrid driving gear 100 is for FR (front engine Riyadh live) cars. The gasoline engine 102 which operates by combustion of a fuel, and the motor generator 104 which has a function as the electric motor which operates with electrical energy, and a generator It has as a source for migration of the car which is a mobile of driving force (source for transit of driving force), and driving force is transmitted to a rear wheel (driving wheel) on either side through a differential gear, an axle, etc. which are not illustrated through the gearing change gear section 108 from the torque converter barter 106. An engine 102 is a source of the 1st driving force, a motor generator 104 is a source of the 2nd driving force where rated output is smaller than an engine 102 and where starting time amount is short, and crankshaft 102s of an engine 102 is connected with 104s of motor shafts of a motor generator 104 through the input clutch 110 which is hydraulic friction engagement equipment.

[0088] An engine 102 is started when a rotation drive (cranking) is carried out through the driving gears 114, such as a timing belt and a chain, by the motor generator 112 for engine starting. This motor generator 112 is operated by low batteries, such as about 36V, and is alternatively connected to a rechargeable battery 118 and the fuel cell 120 of a hydrogen-oxygen mold through the power-source change-over switch 116, and while being operated with the electrical energy supplied from it etc., a rechargeable battery 118 is charged with the electrical energy generated by carrying out the rotation drive of the motor generator 112 with an engine 102. Similarly said motor generator 104 is operated by low batteries, such as about 36V, and it connects with a rechargeable battery 118 and a fuel cell 120 alternatively through the power-source change-over switch 122, and while being operated with the electrical energy supplied from it etc., a rechargeable battery 118 is charged with the electrical energy generated by making a motor generator 104 carry out regenerative braking at the time of the moderation under car transit etc. When starting of an engine 102 is slow, when it cannot be started, the power-source change-over switch 122 connects a rechargeable battery 118 and a fuel cell 120 to a serial if needed, and can supply the electrical energy of the high voltage to a motor generator 104 again. In addition, a rechargeable battery 118 can also be charged with a fuel cell

120.
[0089] While the above-mentioned motor generators 104 and 112 are equipped with the inverter which neither illustrates, the fuel cell 120 is equipped with the cooling system. Moreover, it has the rechargeable battery of 12V for various kinds of mounted computers etc., and charges through a DC-DC converter with a fuel cell 120 or a rechargeable battery 118.
[0090] Said torque converter 106 is equipped with the lock-up clutch 130 which links directly between the pump disk 124 connected with 104s of motor shafts, the turbine rotor 128 connected with the input shaft 126 of the gearing change gear section 108, and the pump disks 124, such as it, and turbine rotors 128, and the stator 132 from which rotation of an one direction is prevented with the one way clutch.
[0091] The gearing change gear section 108 is equipped with the 1st change gear 134 which performs yes and two steps of low changes, and the 2nd change gear 136 which can switch the gear ratio of one step of go-astern, and four steps of advance. The 1st change gear 134 is equipped with the epicyclic gear drive 138 of 1 set of simple planetary molds, a brake B0, a clutch C0, and an one way clutch F0, and is constituted. Moreover, the 2nd change gear 136 is equipped with the epicyclic gear drives 140, 142, and 144 of 3 sets of simple planetary molds, a brake B1 - B4, clutches C1 and C2, and one way clutches F1 and F2, and is constituted. At a brake B0 - B4, and clutches C0-C2, all, it is friction engagement equipment of the multi-plate type engaged and released by the actuator, and the hydraulic circuit and oil pressure of the oil pressure control section 146 which are shown in drawing 15 are switched with a solenoid valve etc., by carrying out pressure regulation control, engagement and a release condition are switched and the gear ratio shown in drawing 17 according to the operating state is formed. Hydraulic oil is supplied to the oil pressure control section 146 from the electric oil pump 148, the mechanical oil pump by which a rotation drive is carried out in one with said pump disk 124 and which is not illustrated. In addition, since a motor generator 104, a torque converter 106, and the gearing change gear section 108 are constituted by the abbreviation symmetry target to the center line, the lower half of a center line is omitted in drawing 16 .
[0092] For the hydraulic oil which is drawing showing a part of oil pressure control section 146, and was pumped up by the electric oil pump 148, drawing 18 is line pressure [bulb / 150 / primary regulator] PL according to accelerator opening etc. The pressure is regulated and hydraulic oil is supplied via the manual bulb 154 by which clutches C1 and C2 are mechanically connected with the shift lever 152 as a shift operating member, and a free passage condition is switched. Moreover, the engagement and a release condition are switched also for said input clutch 110 by the input clutch control solenoid 156.
[0093] "P" of drawing 17 is the parking formed when a shift lever 152 is operated to the "P" position of drawing 19 , and rotation of an output shaft 158 (refer to drawing 16) is mechanically prevented by the mechanical Parkin Grock device which is not illustrated while power transfer is intercepted. "R" is a go-astern gear ratio formed when a shift lever 152 is operated to the "R" position. "N" is the neutral formed when a shift lever 152 is operated to the "N" position, and power transfer is intercepted. - "5th" is the advance gear ratio formed when a shift lever 152 is operated to the "D" position "1 st." A change gear ratio (= the rotational frequency of the rotational frequency / output shaft 158 of an input shaft 126) becomes small as it goes to "5th" from "1st." For example, (a) of drawing 20 It is switched by two or more solenoid operated directional control valves (AT solenoid 162 of drawing 22) according to the gear ratio change-over map (gear change map) to which the accelerator opening theta and the vehicle speed V were beforehand set as a parameter as a dotted line showed. Drawing 19 is an example of the shift pattern of a shift lever 152, it is switched by - "4th" "1 st" by "4" positions, is switched by - "3rd" "1 st" by "3" positions, is switched by "1st" and "2nd" by "2" positions, and is fixed to "1st" by the "L" position. (b) of drawing 20 A dotted line is a gear ratio change-over map in the case of "2" positions.
[0094] The continuous line of drawing 20 and drawing 21 is an example of the source change-over map of driving force in which an engine 102 and the use field (each travel corridor) of a motor generator (MG) 104 are shown, and the accelerator opening theta and the vehicle speed V are beforehand set to it as a parameter for every actuation position of a shift lever 152. By this example, it has two transit modes, the motor transit mode it runs only by the motor generator 104, and the engine transit mode it runs only with an engine 102, and in a motor travel corridor, it runs in motor transit mode and runs in engine transit mode in an engine travel corridor. (a) of drawing 20 The "D" position and (b) A comparison of "2" positions expands the use field (motor travel corridor) of a motor generator 104 to the high vehicle speed side for a while rather than 2nd gear ratio in the "D" position by "2" positions in which gear change is performed even for 2nd gear ratio. Moreover, drawing 21 (a) By the "L" position, the motor travel corridor is expanded to the high vehicle speed side for a while rather than 1st gear ratio in "2" positions. In addition, the source change-over map of driving force of "4" positions and "3" positions is drawing 20 (a). It is the same as the case of the

"D" position.
[0095] The sport mode switch 160 of said drawing 19 is (a) of drawing 20 , for example, when it is prepared near the shift lever 152 currently arranged beside the driver's seat and ON (pushing) actuation of this sport mode switch 160 is carried out. As a two-dot chain line shows, a motor travel corridor is made small. You may make it shift the gear change line of a gear ratio change-over map to a high vehicle speed side at the same time it makes a motor travel corridor small.
[0096] Drawing 22 is drawing showing the control network which controls actuation of the hybrid driving gear 100 of this example. While various kinds of signals are inputted into ECU (Electronic Control Unit)164 from a switch, a sensor, etc. which are shown in the left-hand side of drawing 22 By outputting a control signal etc. to various kinds of equipments which perform signal processing according to the program beforehand memorized by ROM etc., and are shown in right-hand side The operational status of the vehicle speed V, the accelerator opening (control input of an accelerator pedal) theta, a shift position (actuation position of a shift lever 152), etc., etc. is embraced. For example, switch the gear ratio of the gearing change gear section 108, or Actuation of an engine 102 and a motor generator 104 is controlled. The controller (MG104) 166 of drawing 22 and a controller (MG112) 168 are inverters which perform output (torque) control, regenerative control, etc. of motor generators 104 and 112.
[0097] And in case it starts in order to use an engine 102 as a source of driving force, signal processing is performed by ECU164 according to the flow chart of drawing 23 . Input signal processing of reading various kinds of signals required for this control at step R1 is performed. At step R2 Whether the engine starting conditions for using an engine 102 as a source for transit of driving force are satisfied For example, the actuation position of the shift lever 152 detected by the shift position sensor 170, It judges by whether it went into the engine travel corridor of the source change-over map of driving force shown in drawing 20 and drawing 21 as a continuous line based on the accelerator opening (control input of an accelerator pedal) theta detected by the vehicle speed V detected by the speed sensor 172, and the accelerator opening sensor 174.
[0098] If decision of the above-mentioned step R2 is YES (affirmation), while carrying out cranking of the engine 102 by the motor generator 112 for engine starting in step R3, ignition timing control, fuel-injection control, etc. will be performed. At the time of activation of this engine starting processing, the input clutch 110 is released and the engine 102 is separated from the driving force transfer system. The part which performs step R3 among signal processing by ECU164 is functioning as an engine starting means. Although change-over control of the gear ratio of the gearing change gear section 108 will be performed to drawing 20 at the following step R4 according to the usual gear change map shown by the dotted line in step R5 if it judges whether the engine 102 actually started and an engine 102 starts in the predetermined time amount defined beforehand When an engine 102 does not start in time amount predetermined by a certain reason, such as failure, less than [step R6] is performed following step R4, a motor generator 104 is used instead of an engine 102, and predetermined driving force is generated. The part which performs step R4 among signal processing by ECU164 is functioning as a starting delay decision means.
[0099] At step R6, in order that the residue of the fuel of the fuel cell (FC) 120 detected by the fuel-cell-fuel residue sensor 176 may become below the predetermined value defined beforehand and may use a motor generator 104 as a source for transit of driving force, it judges whether electrical energy can be supplied from a fuel cell 120. When there are more residues of fuel cell fuel than a predetermined value, the series connection of a fuel cell 120 and the rechargeable battery 118 is carried out with said power-source change-over switch 122 at step R7, and electrical energy is supplied to a motor generator 104. Moreover, at step R8, permanent wave MENTO processing of a generation of electrical energy of a fuel cell 120 is performed, and the amount of generations of electrical energy is made [many] exceeding the amount of rated generations of electrical energy by time amount limitation. That is, it is made to increase temporarily to the amount which a long period of time is impossible for, and is usually used neither on a thermal problem nor the problem on durability. Thus, while using together a fuel cell 120 and a rechargeable battery 118, the output of a motor generator 104 can pull up exceeding rated output by increasing the amount of generations of electrical energy of a fuel cell 120 exceeding the amount of rated generations of electrical energy. Thereby, the lack of driving force accompanying the starting delay of an engine 102 is eased. The part which performs steps R7 and R8 among signal processing by ECU164 constitutes the auxiliary drive control means with the power-source change-over switch 122. That is, this example is equivalent to the example of the 4th invention - the 7th invention. In addition, on the occasion of implementation of the 4th invention, step R7 is not necessarily required, on the occasion of implementation of the 5th invention, step R8 is not necessarily required, and it is not necessarily required for a motor generator 104 to exceed the rated output on the

occasion of implementation of the 6th invention and the 7th invention.
[0100] At the following step R10, as gear change is performed to drawing 20 by the high vehicle speed side rather than the usual gear change map shown by the dotted line, driving force also with the big motor generator 104 with rated output smaller than an engine 102 is obtained.
[0101] On the other hand, when the residue of fuel cell fuel is [decision of step R6] NO below in a predetermined value, while performing step R9 and operating a motor generator 104, using a rechargeable battery 118 independently, a gear change map is changed at step R10. It is desirable to enlarge the amount of modification of a gear change map at step R9 as compared with the case where it performs at step R10 in this case following steps R7 and R8 since the output of a motor generator 104 is low as compared with the time of activation of steps R7 and R8.
[0102] Thus, the hybrid driving gear 100 of this example In order to run an engine 102 as a source of driving force, in case an engine 102 is started at step R3, when starting of the engine 102 is slow If decision of step R4 is set to NO, less than [step R6] is performed and there are residues of enough of fuel cell fuel, while carrying out the series connection of the fuel cell 120 and rechargeable battery 118 and supplying electrical energy to a motor generator 104 In order to operate a motor generator 104 exceeding rated output by increasing the amount of generations of electrical energy of a fuel cell 120 exceeding the amount of rated generations of electrical energy, The lack of driving force by which it is accompanied improper [the starting delay of an engine 102 or starting] is improved rated output adopting a small cheap and compact thing as a motor generator 104 which is a source of the 2nd driving force. Thereby, in case it departs from the time of the shift to engine transit mode from motor transit mode, or an engine 102 as a source of driving force, the thing which are formed even if it originates in the starting delay of an engine 102 and which it comes, and admiration arises or starting of an engine 102 therefore becomes improper transit impossible is prevented.
[0103] Moreover, as compared with the case where driving force is generated using an another electric motor 60 and an another motor generator 24 like said example, in order to pull and run to high torque in the case of the engine starting delay at the time of the shift to engine transit mode from motor transit mode, using the motor generator 104 which was being used in motor transit mode as it is, while being able to increase driving force smoothly, control is easy.
[0104] Moreover, in this example, a fuel cell 120 and a rechargeable battery 118 are used as an electrical energy source of supply of a motor generator 104. As opposed to electrical energy being alternatively supplied from either usually, when starting of an engine 102 is slow While carrying out the series connection of a fuel cell 120 and rechargeable batteries 118, such as it, and supplying electrical energy to a motor generator 104 In order to operate a motor generator 104 exceeding rated output by increasing the amount of generations of electrical energy of a fuel cell 120 exceeding the amount of rated generations of electrical energy, It is possible to adopt the cheap and compact thing which has the amount of rated generations of electrical energy small as a fuel cell 120, and the hybrid driving gear 100 is still cheaper, and is constituted by the compact.
[0105] As mentioned above, although the example of this invention was explained to the detail based on the drawing, this etc. is 1 operation gestalt to the last, and this invention can be carried out in the mode which added various modification and amelioration based on this contractor's knowledge.

[Translation done.]

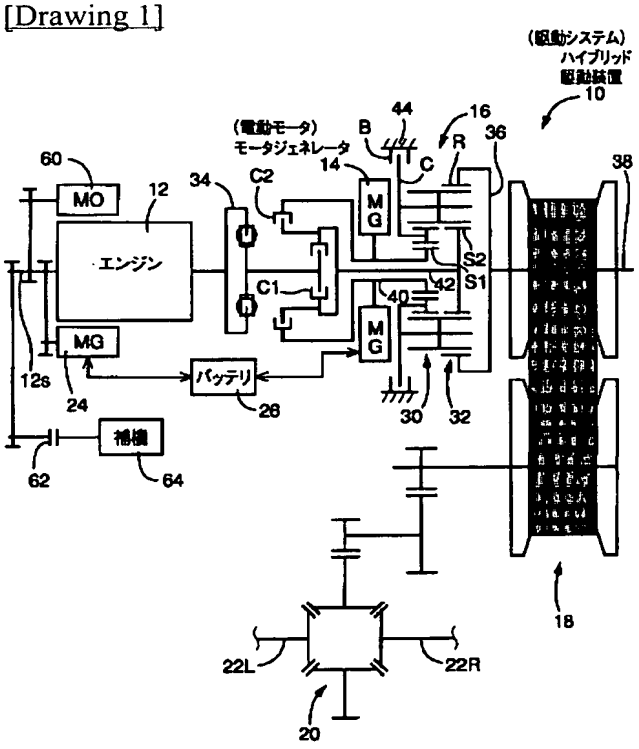
* NOTICES *

DRAWINGS

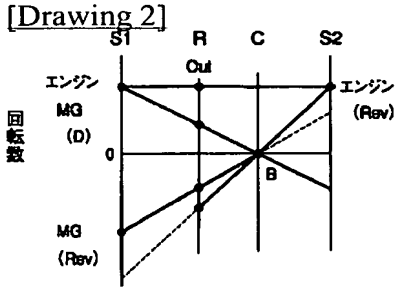
[Drawing 9]

3.0

[Drawing 1]



[Drawing 2]

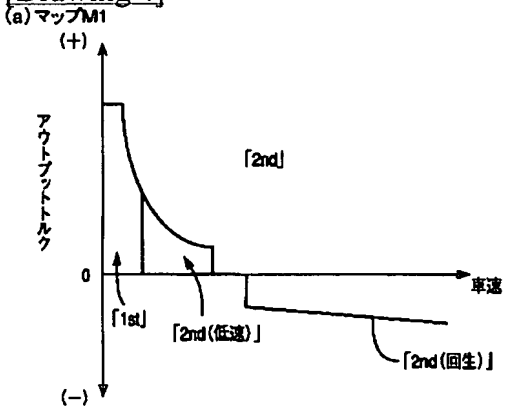


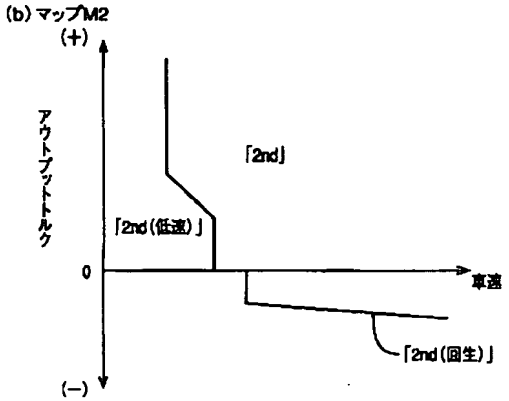
[Drawing 3]

	操作ポジション	変速モード	C1	C2	B	変速比
エンジン12	D,M,B	2nd	○	○	×	1
		2nd(低速)	△	○	×	1
	R	高速	○	×	○	−1/ρ2
		低速(エンジン)	△	×	○	−1/ρ2
	N		×	×	○	
MG14	D,M,B	1st	×	×	○	1/ρ1
		2nd(アシスト)	○	○	×	1
		2nd(回生)	×	○	×	1
	R	低速(モータ)	×	×	○	−1/ρ1

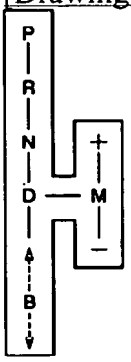
○係合 △スリップ ×解放

[Drawing 4]

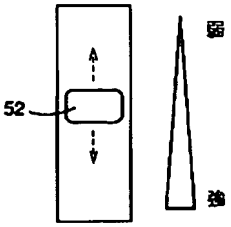




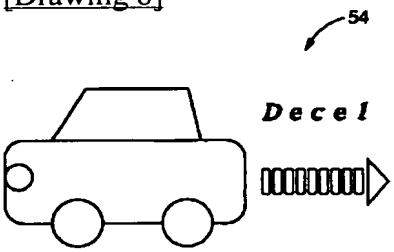
[Drawing 6]



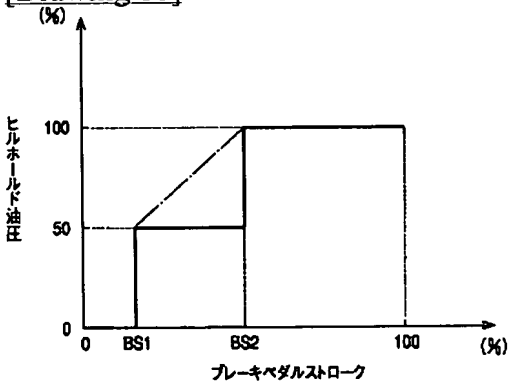
[Drawing 7]



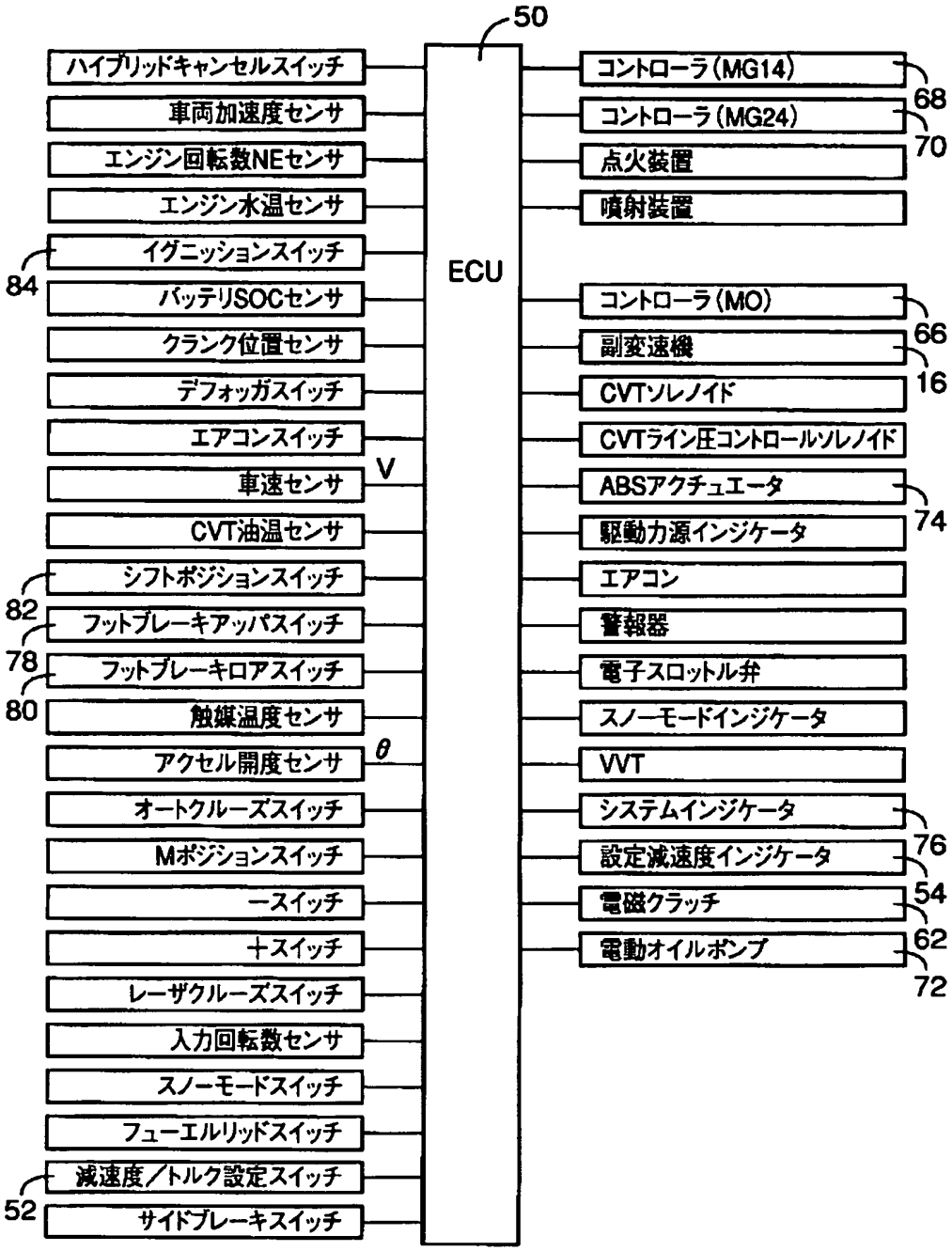
[Drawing 8]



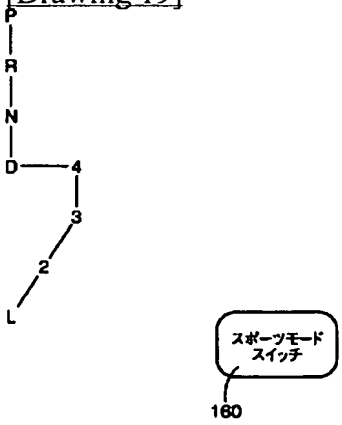
[Drawing 10]



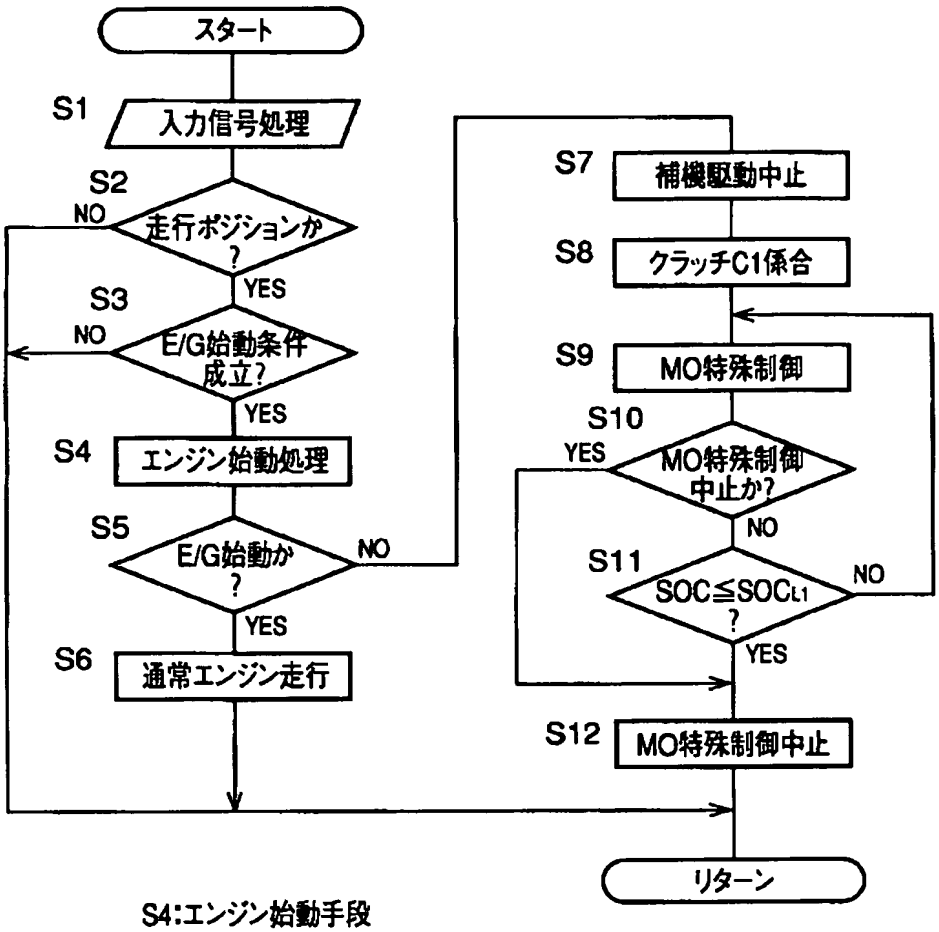
[Drawing 5]



[Drawing 19]



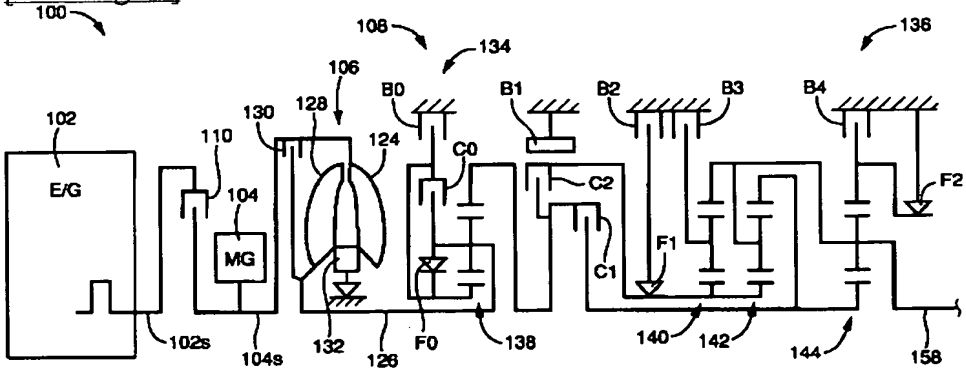
[Drawing 11]



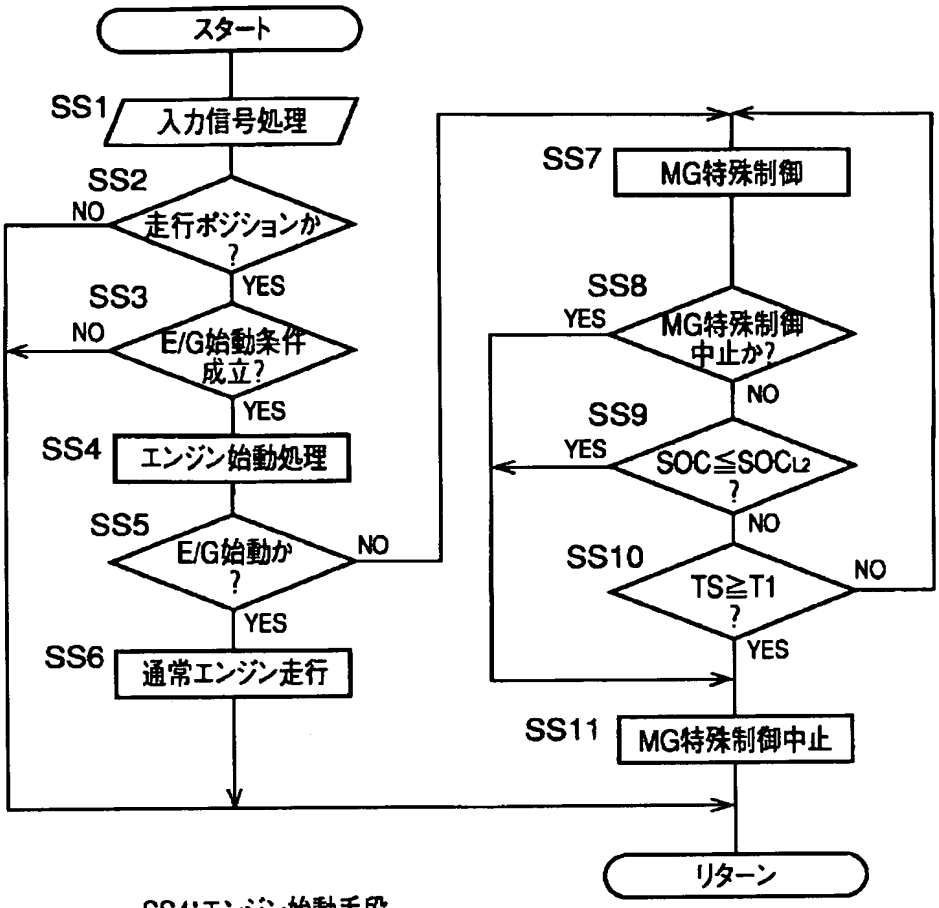
S4:エンジン始動手段

S8,S9:補助駆動制御手段

[Drawing 16]



[Drawing 12]



SS4:エンジン始動手段

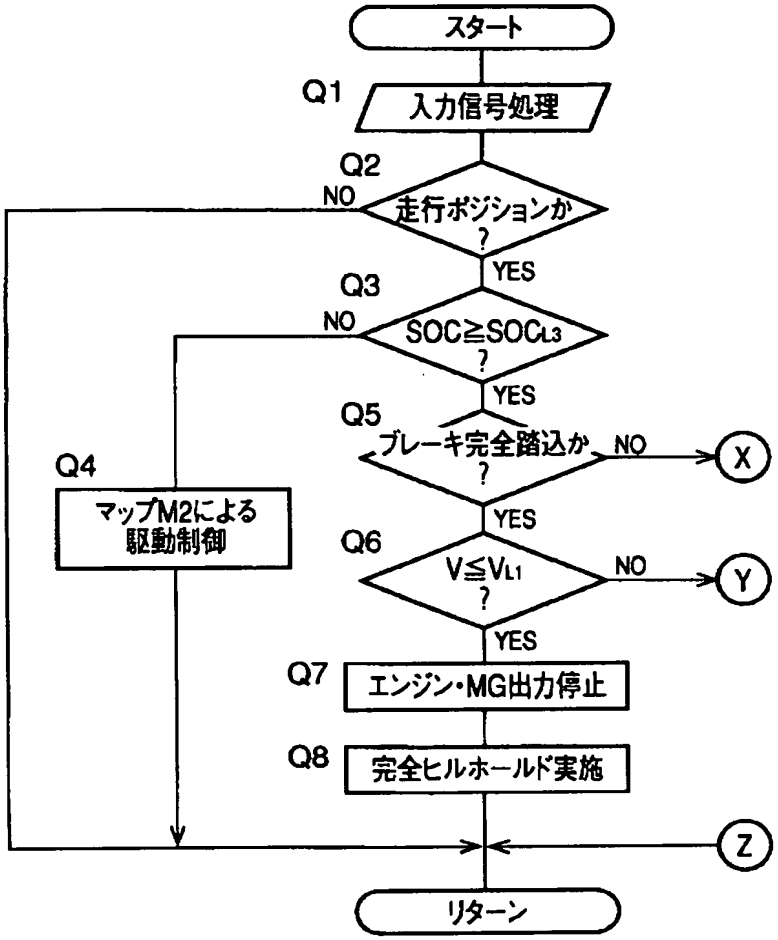
SS7:補助駆動制御手段

[Drawing 17]

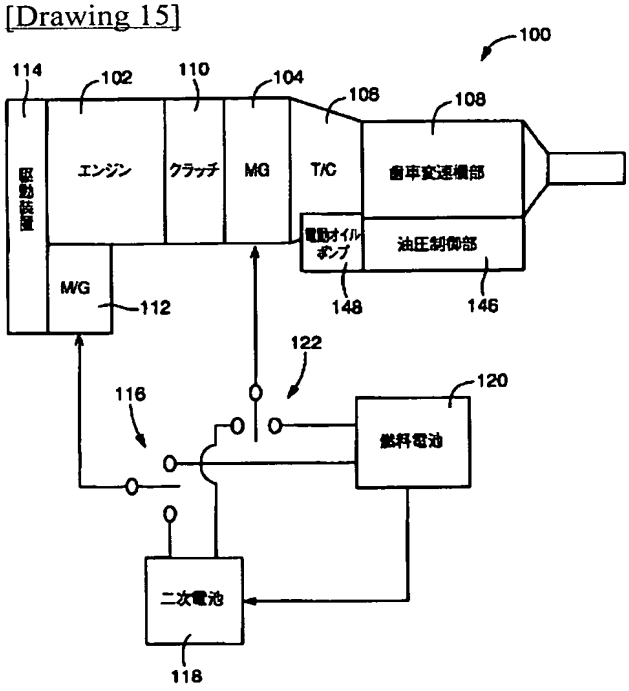
	C0	C1	C2	B0	B1	B2	B3	B4	F0	F1	F2
P	○								○		
R			○	○				○			
N	○								○		
1st	○	○						◎	○		○
2nd	◎	○					○		○		
3rd	○	○			◎	○			○	○	
4th	○	○	○			△			○		
5th		○	○	○		△					

○係合 ◎エンジンブレーキ時係合 △係合するが動力伝達に関係無し

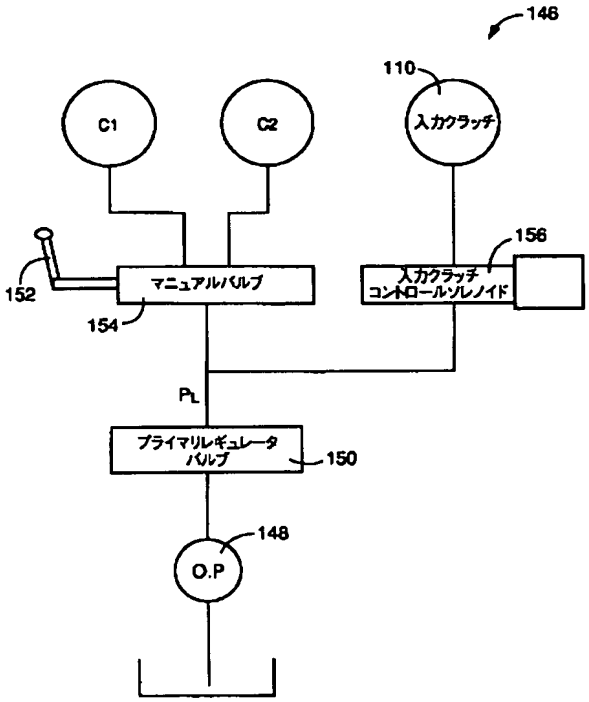
[Drawing 13]



[Drawing 15]

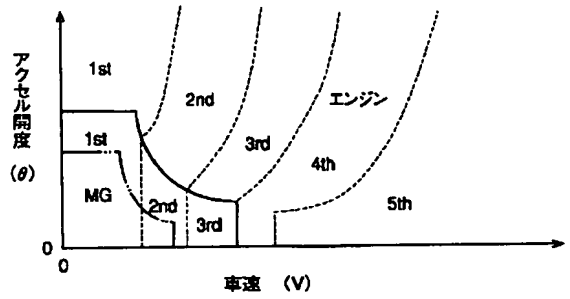


[Drawing 18]

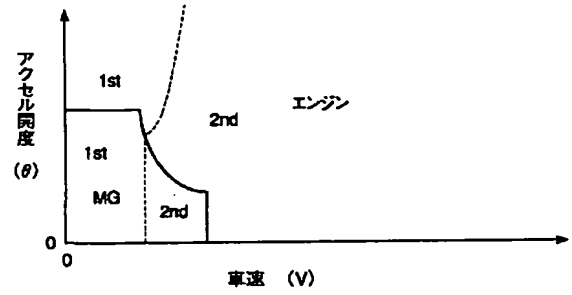


[Drawing 20]

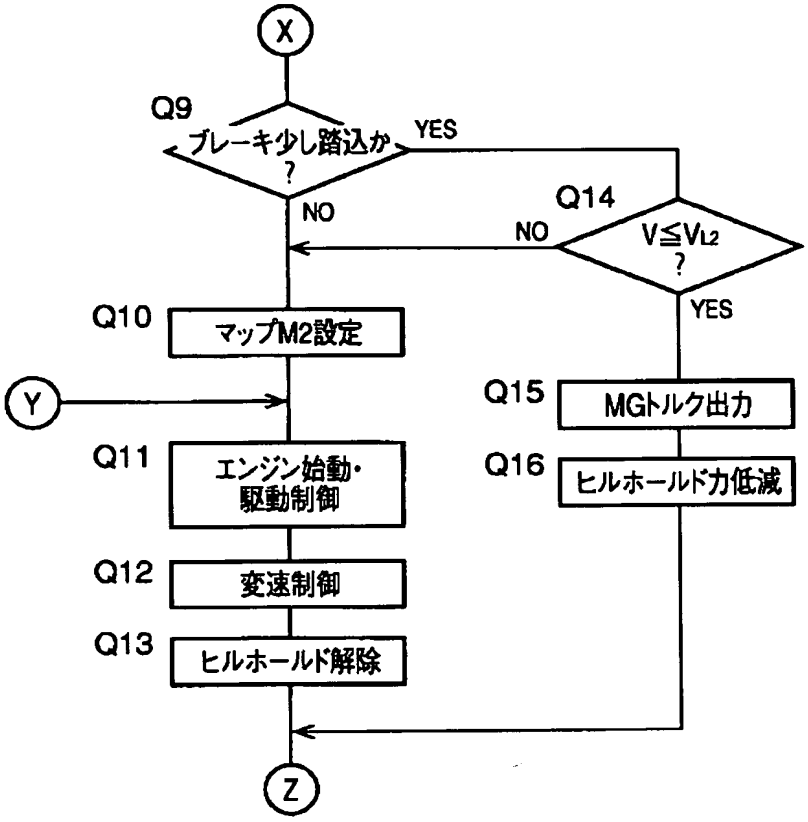
(a) Dポジション



(b) 2ポジション



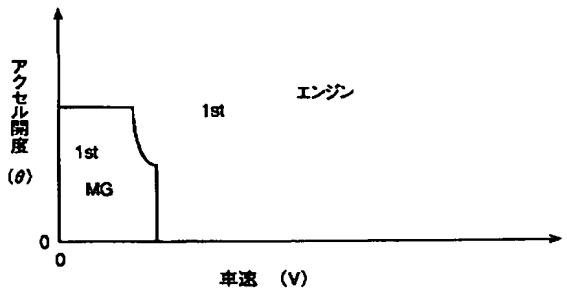
[Drawing 14]



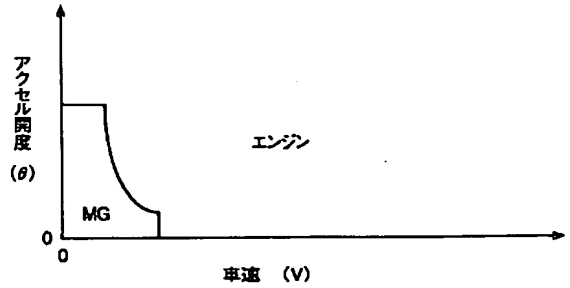
Q11:低速エンジン走行手段,高速エンジン走行手段
Q15:低速モータ走行手段

[Drawing 21]

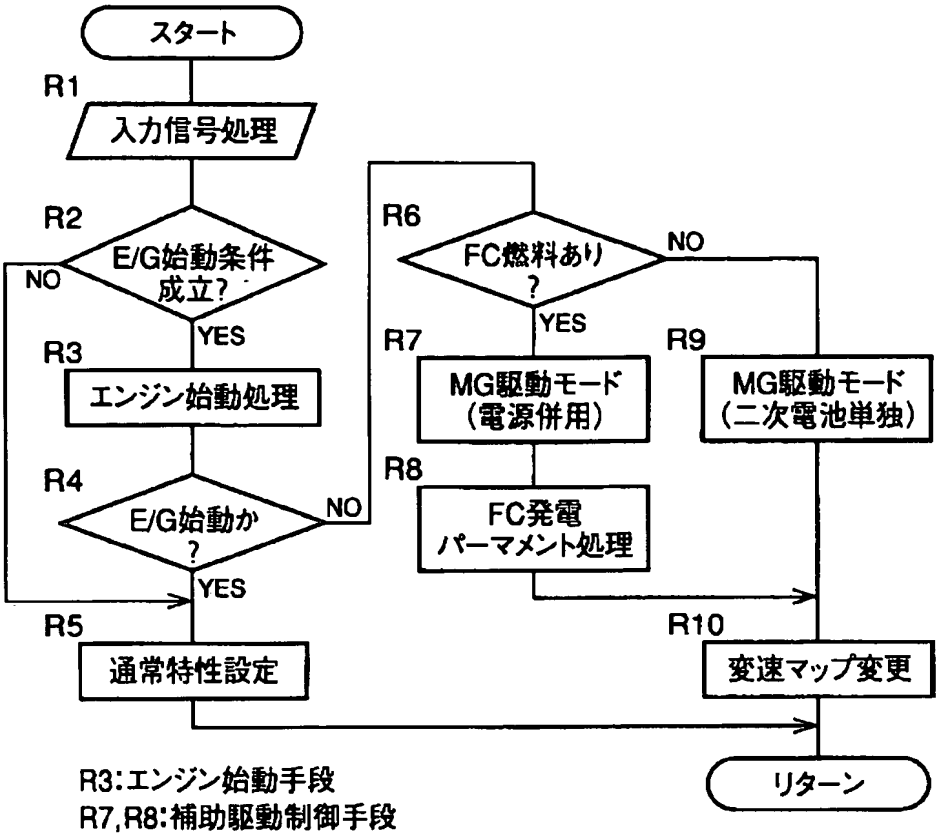
(a) Lポジション



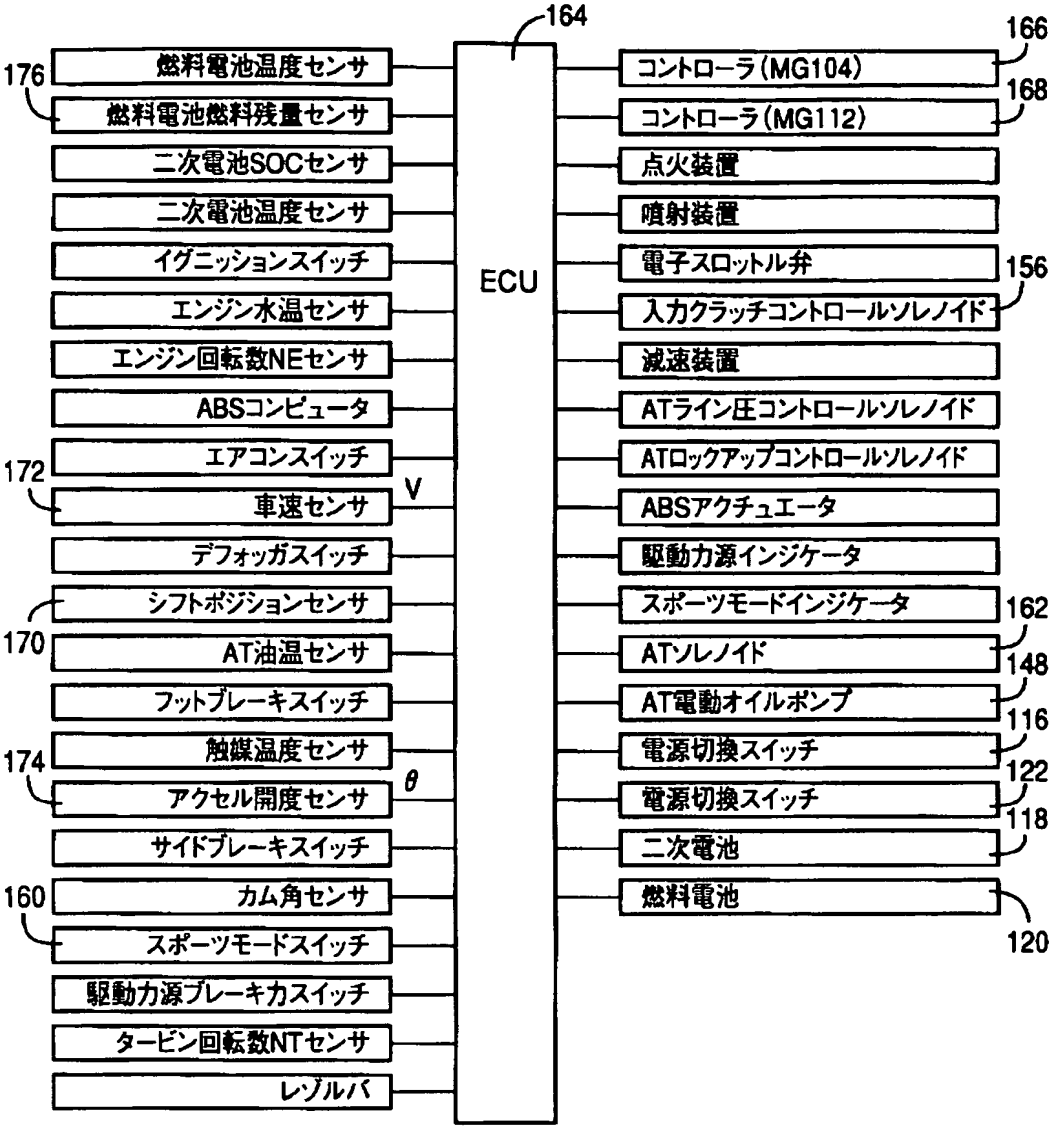
(b) Rポジション



[Drawing 23]


スタート
R1
入力信号処理
R2
E/G始動条件成立?
NO
YES
R3
エンジン始動処理
R4
E/G始動か?
NO
YES
R5
通常特性設定
R6
FC燃料あり?
NO
YES
R7
MG駆動モード(電源併用)
R8
FC発電パーマメント処理
R9
MG駆動モード(二次電池単独)
R10
変速マップ変更
リターン
R3:エンジン始動手段
R7,R8:補助駆動制御手段

[Drawing 22]



[Translation done.]